VOLUME XXII MAY 1929 NUMBER 5

Southern Medical Journal

Journal of the Southern Medical Association

Published monthly by the Southern Medical Association, Empire Building, Birmingham, Ala. Annual subscription $4.00. Entered as Second-Class Matter at the Post Office at Birmingham, Ala., under Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in Sec. 1103, Act of Oct. 3, 1917, authorized Dec. 20, 1921.

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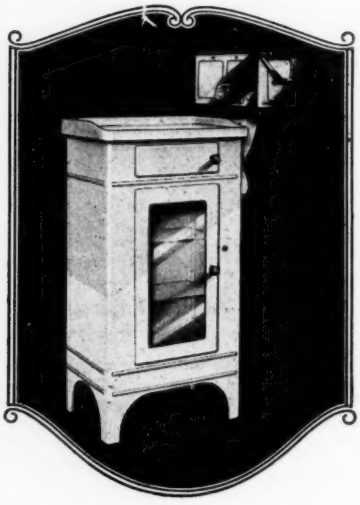

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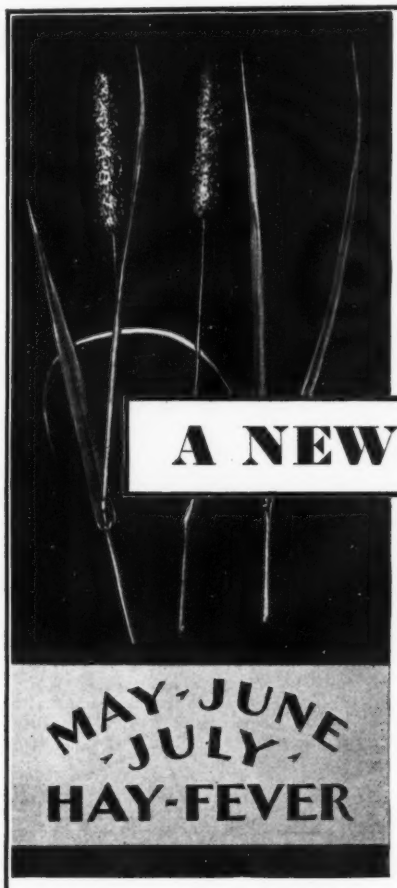

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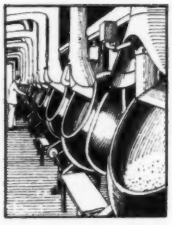

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Journal A.M.A., August 4, 1928

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The need of Vitamin B supplementation for the bottle-fed baby is readily seen. Cow's milk is variable in this factor, and very often it contains only sufficient Vitamin B to supply the infant's minimum level of requirements instead of the optimum. Therefore, when the milk is diluted, the vitamin content is reduced below the safety line.

In the case of the breast-fed infant, Macy and her co-workers have found it possible "that many mothers do not supply enough Vitamin B to their babies. At best, the average healthy mother is producing a milk that is exceedingly low in Vitamin B."

The need for the addition of Vitamin B to cow's milk modified for infant feeding has been proved in the studies referred to and in other important studies.

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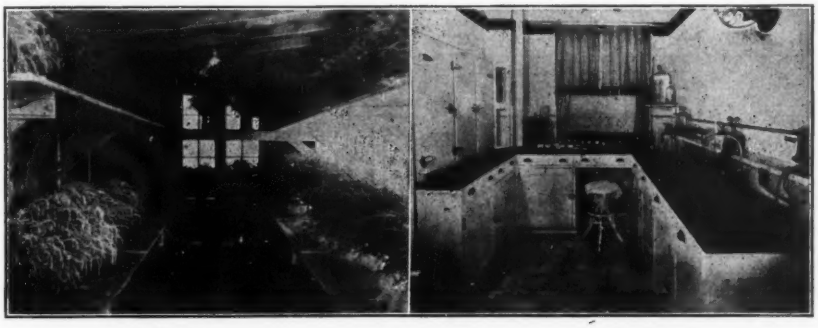

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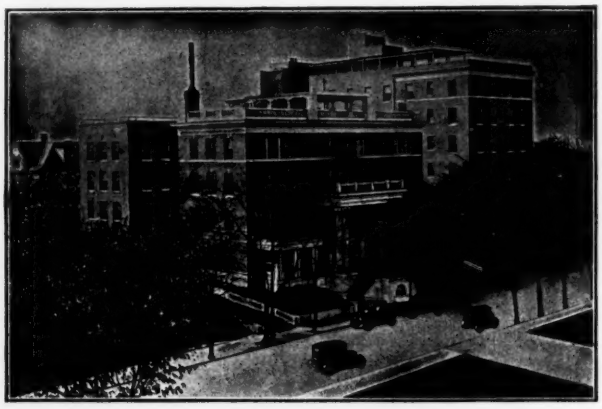

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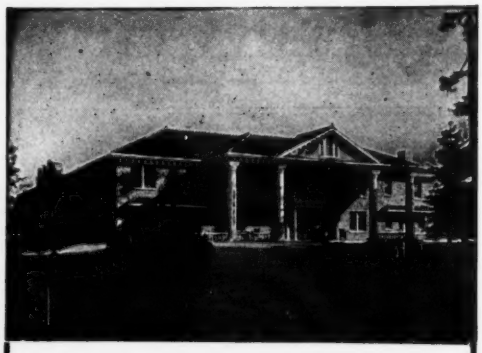

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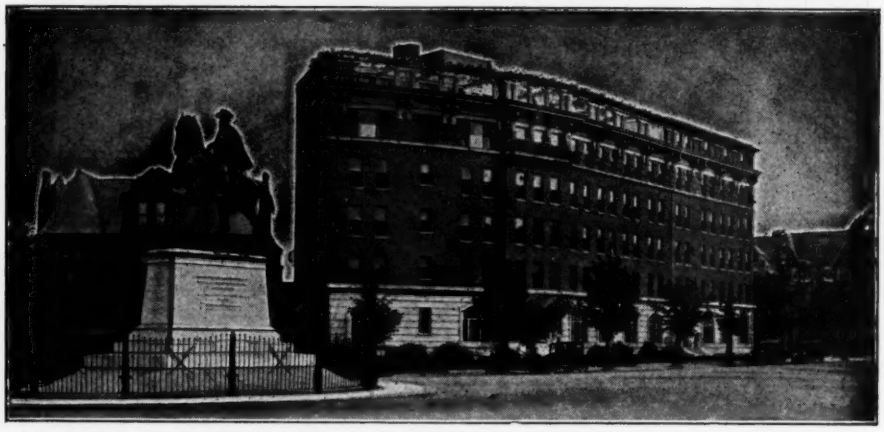

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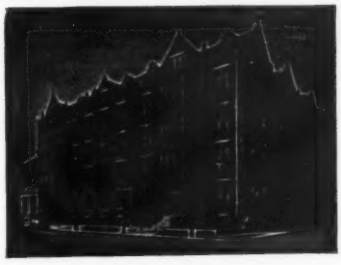

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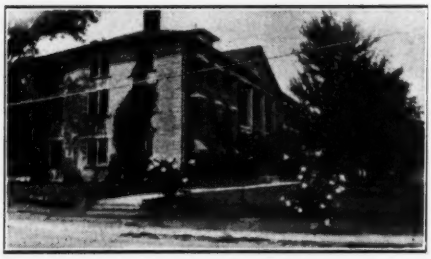

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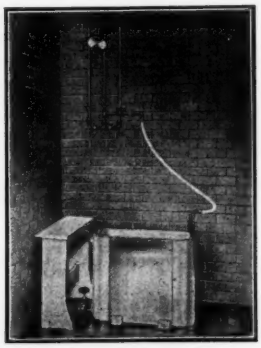

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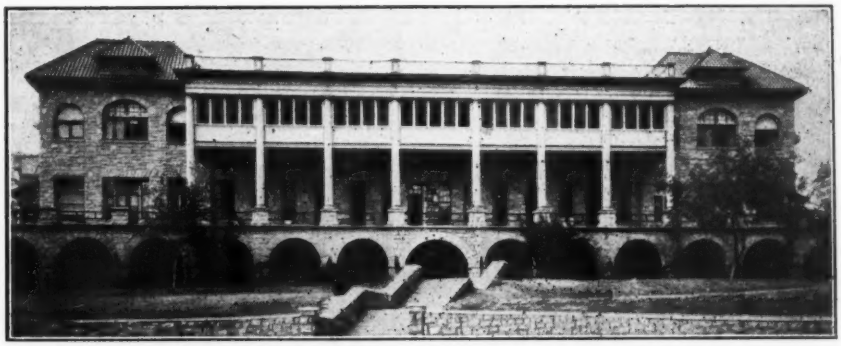

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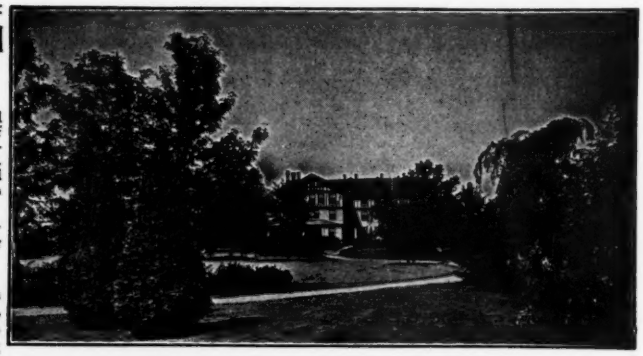

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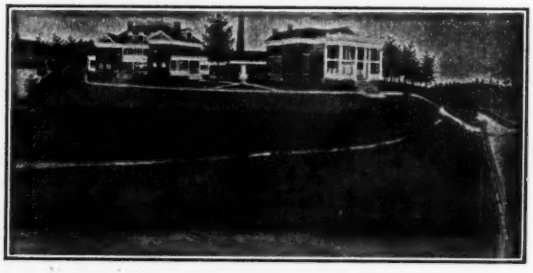

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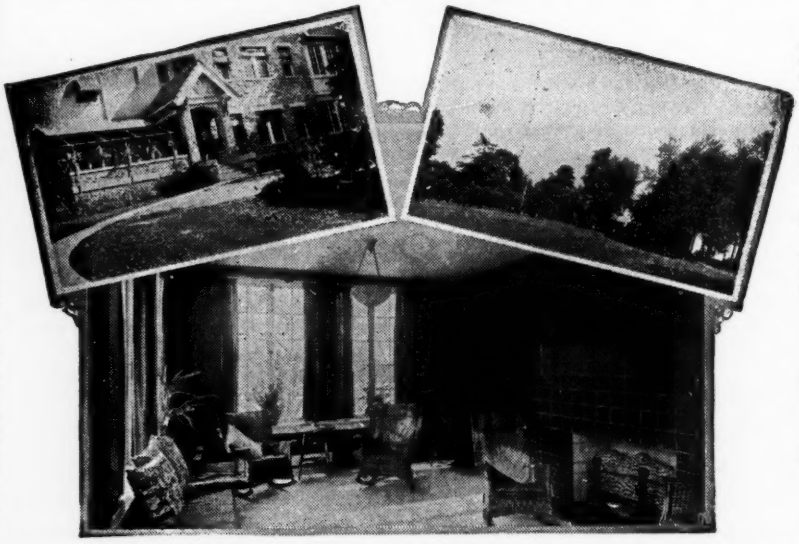

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Volume XXII MAY 1929 Number 5

EXPERIMENTAL RESULTS IN THE USE OF DEAD FASCIA GRAFTS FOR REPAIR OF DEFECTS IN THE HOLLOW VISCERA*†

By AMOS R. KOONTZ, M.D.,
Baltimore, Md.

For several years past I have been interested in the use of preserved fascia grafts for hernia repair. The report of both my experimental[1] and clinical[2 3 4] results has been published.

About three years ago, while working on another problem with Dr. Dean Lewis, I became interested in the repair of stomach and bladder defects with alcohol-preserved ox fascia lata. About the same time I discussed the subject of dead grafts with Dr. Harvey Stone, who suggested the use of a cuff of preserved fascia to strengthen weak anastomosis points after end-to-end intestinal anastomosis. The object of this paper is to report experimental results in the use of dead fascia for the repair of defects in the three above-mentioned hollow viscera: stomach, bladder and intestine.

STOMACH

Sixteen operations have been performed in which a piece of the full thickness of the stomach wall, one to two inches in diameter, was resected from the anterior surface of the cardiac portion near the greater curvature. This defect was repaired in each case by suturing in a suitable-sized piece of alcohol (70 per cent) preserved ox fascia lata, which had first been rinsed in normal salt solution. The areolar tissue was left on the side of the fascia that was to face the lumen of the stomach, but was cleaned away on the other side. Two rows of sutures were used in fixing the fascia in place: the first (*Fig. 1*) an ordinary running stitch of fine black silk, suturing the edge of the fascia proper to the fibrous and muscle coats of the stomach; the second (*Fig. 2*) a continuous Lembert stitch of fine black silk, which buried the first suture line. In both cases care was taken to have the needle puncture only the fascia proper and not the inner layer of areolar tissue. In this way the stitch holes were protected by the areolar tissue from contact with the stomach contents, and leakage was prevented.

Attempts to repair defects in the stomach by the use of living fascia were made by Neuhof,[5] in 1917. In all instances the implanted fascia was digested by the gastric juice, and perforation occurred. Neuhof found, however, that if gastro-enterostomy was also performed perforation was prevented and satisfactory healing ensued. In my early operations perforation did not occur, and I wondered if alcohol-preserved fascia was more resistant to the action of the gastric juice than living fascia. This, however, did not seem logical, as we have no reason for believing that the collagen fibers of the connective tissues are altered either chemically or physically by preservation in alcohol. I was not kept long in suspense, as the middle cases of the series all perforated due to digestion of the fascia. I still have no explanation for the absence of digestion and perforation in the early cases. In the last five cases operated upon I was able to prevent digestion of the implant by giving the dog three ounces of bismuth subnitrate by stomach tube on the operating table as soon as the defect in the stomach was closed, and then giving one ounce daily in milk for the following two weeks. The bismuth probably protected the implant from the gastric juice by forming a mechanical coating over it.

Observations made on sites of implanted fascia one week after the original operation showed that the implant was covered by a thick layer of fibrin which completely obscured both the implant and suture line. In one case (*Fig. 3*)

*Read in Section on Surgery, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

†From the Surgical Hunterian Laboratory of the Johns Hopkins Medical School.

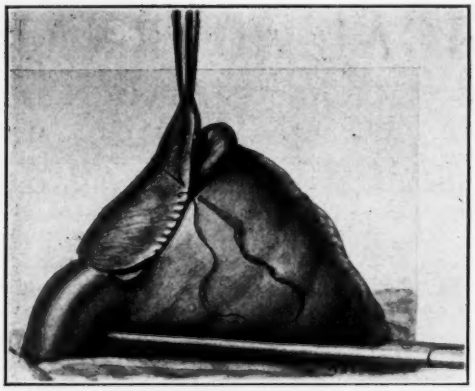

Fig. 1
Suturing dead fascia graft into stomach defect. First row of sutures.

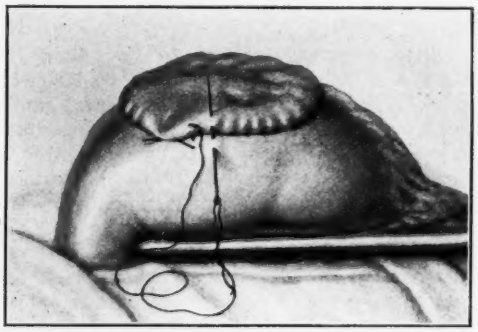

Fig. 2
Suturing dead fascia graft into stomach defect. Second row of sutures.

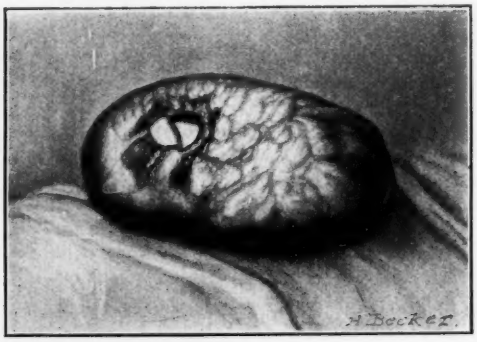

Fig. 3
Site of implant in stomach one week after operation. The implant is covered by fibrin, a flap of which has been turned back, exposing implant.

a flap of this fibrin was thrown back, revealing the intact fascia graft beneath it. By the end of three weeks the fibrin had been transformed into connective tissue to which were attached a few omental adhesions. The serosa repaired itself over this connective tissue, and cases examined two and three months after operation showed a glistening serous surface with a few omental adhesions. The outline of the original

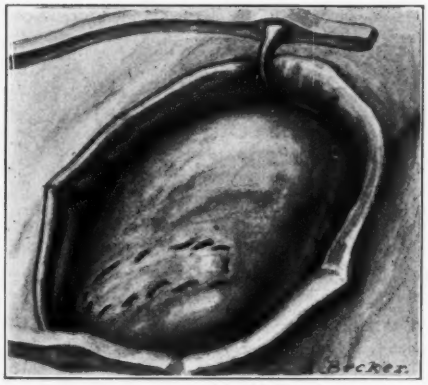

Fig. 4
Site of implant of dead fascia graft to repair stomach defect. Eight months after operation. The outline of the implant is shown by black silk sutures.

Fig. 5
Site of implanted fascia in stomach defect, seen from the inside. Two months after operation. Implant has been entirely covered with mucosa, except for a small area 1 cm. in diameter in the center.

graft was often indicated by the continuous Lembert suture of black silk (*Fig. 4*). The mucosa had generally repaired itself over the inner side of the graft by the end of three months (*Fig. 5*). Microscopic sections showed that the mucosa covering the graft contained glands (*Fig. 6*). In one case observed eight months after operation (*Fig. 8*) a tear in the mucosa revealed the intact original graft which could readily be distinguished by the large fibers of the ox fascia lata. A fine network of blood vessels was seen pervading the graft. In some cases observed from several months to a year after operation only a mass of dense scar tissue could be found between the serosa and mucosa at the site of implantation, and the fibers of the original graft were not distinguishable.

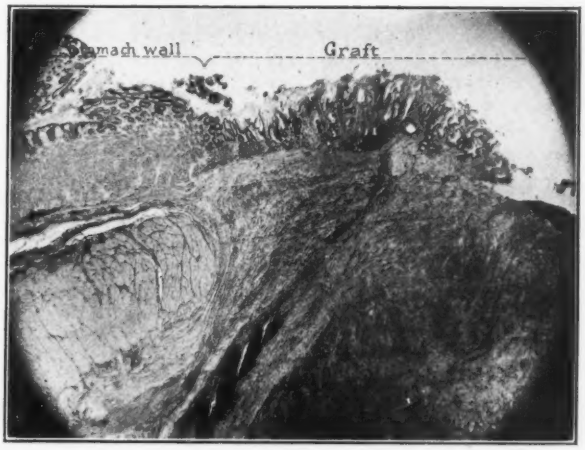

Fig. 6

Microscopic section through edge of dead fascia graft in stomach defect. Two months after operation. Mucosa covering edge of graft.

BLADDER

In six dogs a defect similar to that made in the stomach was produced in the upper portion of the bladder. The defect was repaired with alcohol-preserved ox fascia lata, using the same technic as that employed in the stomach (*Fig. 9*). The problem in the bladder was much simpler than in the stomach, as it was not necessary to guard against digestion. The process of healing and organization went on just as in the stomach. Fibrin was deposited over the implant. This was transformed into connective tissue, which became covered with glistening serosa, to which were attached a few omental adhesions (*Fig. 10*). The mucosa repaired itself within three months. Microscopic sections showed the mucosa over the graft to be lined with the usual stratified epithelium of bladder mucosa.

Hohmeier,[6] in 1911, reported partially successful results with the use of living fascia grafts for the repair of vesical defects. Kostenko and Rubaschew[7] in 1912 were able to close small defects in the bladder with patches of living fascia. Neuhof[5] in 1917 developed a technic by which he was able to obtain uniformly successful results when very large defects in the bladder were repaired by living fascia grafts. Schmid[8] in 1913 successfully operated upon a vesico-vaginal fistula, which had been operated upon several times previously without success, by using a piece of fascia to reinforce the suture line in the bladder. Konig[9 10] had previously reported success in reinforcing weak suture lines in the stomach, bladder, intestine and esophagus by suturing a piece of fascia over the weak point.

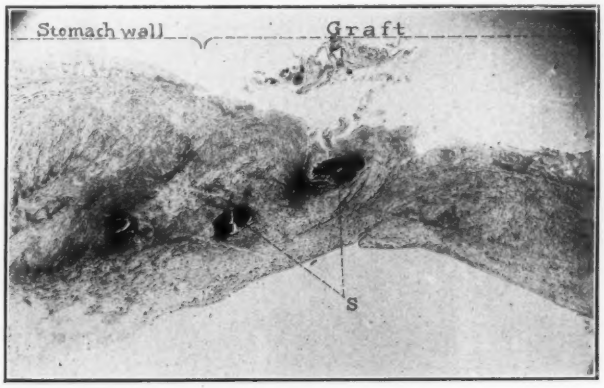

Fig. 7

Union of dead fascia graft with stomach wall. Three weeks after operation. S. Black silk sutures.

INTESTINE

In six dogs an end-to-end anastomosis was performed in the small intestine, and the anastomosis point strengthened by suturing around it a cuff (*Fig. 11*) of al-

cohol-preserved areolar tissue removed from ox fascia lata. The fascial cuff became organized with the serous coat of the intestine, and was covered with glistening serosa to which very few adhesions were attached (*Figs. 12* and *13*). There was no tendency to constict the lumen of the intestine in any of the cases.

While the work here reported was in progress, Romeo[11] reported the successful use of grafts of fixed aponeurosis to replace loss of substance in the wall of the intestine. This, so far as I know, is the only other instance in which dead grafts have been used to repair defects in the hollow viscera. Romeo states that the fixed grafts produced less reaction about them than living grafts. Mauclaire,[12] in 1923, reported the use of alcohol-preserved serosa of sheep to cover

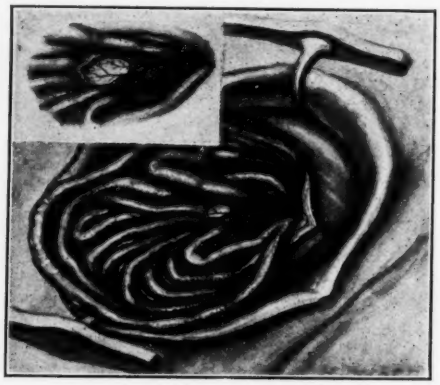

Fig. 8

Site of implantation of preserved fascia graft in stomach defect. Eight months after operation. A piece of the overlying mucosa has been removed, showing the intact graft pervaded by fine blood vessels.

Fig. 9

Implantation of preserved fascia graft in bladder defect.

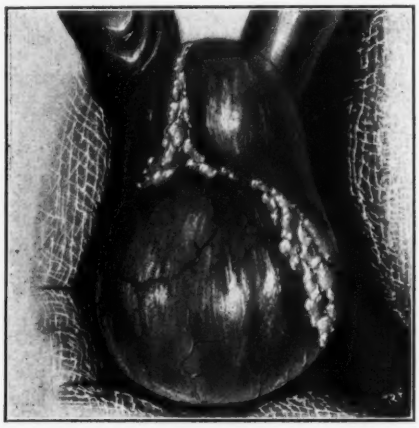

Fig. 10

Healing of bladder defect shown in Fig. 9. Three months after operation. The graft is outlined by the black silk suture.

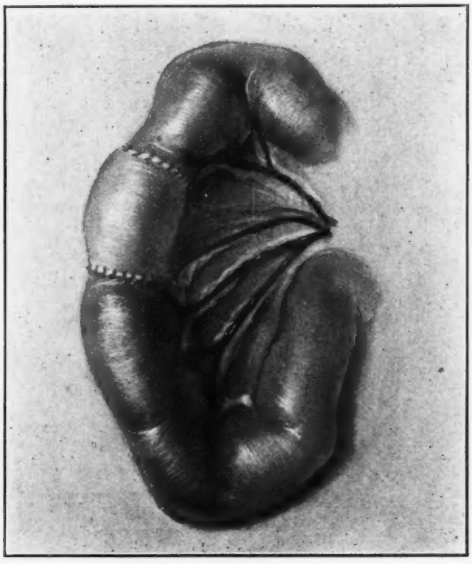

Fig. 11

Reinforcement of end-to-end intestinal anastomosis with a cuff of preserved fascia.

raw surfaces in the human intestine, with a view to preventing the formation of adhesions.

COMMENT

The theoretical considerations involved in the use of preserved fascia grafts have been fully discussed in previous communications.[1 2 4] Nageotte's[13] conception of the collagen fibers of the connective tissues as inert non-living substances, led him to the use of dead tendon grafts for the repair of anatomic defects in living tendons in 1917. The fundamental biological mechanism may be briefly stated as follows: the dead cells of the graft are carried away by the wandering cells of the host, fibro-blasts from the host unite with the framework of the graft, and a new vascular network is installed. The fibers of the graft do not act as a foreign body, produce phagocytosis, or show a tendency to be absorbed, because they have not been altered either chemically or physically by their preservation in alcohol. They are similar in every way to like fibers of the host among which they are implanted. Alcohol-preserved fascia from other individuals and from other animals can be used with impunity, because alcohol destroys antigen and thus eliminates the foreign protein reaction that prevents the successful employment of living heterogeneous grafts.

Fig. 12

End-to-end intestinal anastomosis point, reinforced with a cuff of preserved fascia. Thirty-five days after operation.

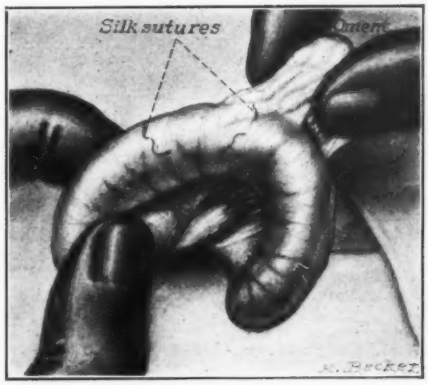

Fig. 13

End-to-end intestinal anastomosis point reinforced with a cuff of preserved fascia. Five months after operation.

CONCLUSIONS

Alcohol-preserved fascia grafts have been successfully used to repair defects in the stomach and bladder, and to reinforce suture lines at anastomosis points in the intestine. Digestion of the graft in the stomach was prevented by giving bismuth subnitrate by mouth.

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13. For a full review and bibliography of Nageotte's views and work see author's paper quoted in Reference No. 1.

DISCUSSION (*Abstract*)

Dr. J. Shelton Horsley, Richmond, Va.—Doctor Andrews, of Chicago, and Doctor Gallie, of Toronto, have used autogenous transplants for repairing hernias. The great objection to this is that it often requires an extra incision. Doctor Koontz has shown quite definitely that fascia lata preserved in alcohol will substitute for these autogenous transplants, and will apparently do just as well. When we use this preserved fascia of Doctor Koontz to repair a fascia defect we are using the same tissue, with the same biological function and structure, as Doctor Koontz has shown in previous articles, and it really assumes this function, acting as well as the original fascia itself.

In the transplantation for covering hollow viscera the problem is different, and I doubt that the method will be of as much use for that purpose as in repairing hernia. Some time ago I did experiments to correct a defect in a dog's common duct by transplanting a piece of vein. From the anatomical standpoint this would seem to be ideal, because, first, it is tough; second, it is thin, and requires but little nutrition. Some of the animals lived for a while after I improved the technic, but finally they all died. From the standpoint of accomplishing what I tried to do the experiment was a failure, but from the standpoint of watching the tissues it was most interesting. It was found that the contact of bile irritated the transplanted vein, and, inevitably, sooner or later stricture occurred, whereas if we turn up a flap from the duodenum that is accustomed to bile, that has the same environment, it acts satisfactorily. We know that where fascia has been used in reconstructing a ureter, bone has developed, not a deposit of calcium salts but actual bone.

Doctor Koontz' work is valuable. The experiments in the stomach later on will probably show definite scar tissue formation. The examination of the dogs in which the stomach was repaired by fascia shows, as a late result, practically nothing but scar tissue at the defect. The use of areolar tissue will doubtless find some field.

The biological process is quite different in fascia, and allows the use of dead fascia, whereas other tissue would probably slough.

Dr. Walter Hughson, Baltimore, Md.—One of the things Doctor Koontz emphasized in his other papers should be borne in mind in considering this problem; that is, that even though living fascia is used, at the end the fascia is no more alive than is the preserved fascia, for the living cells die and all that is available for use is the collagen which is preserved in the dead fascia. I see really no difference between living fascia and the preserved fascia which Doctor Koontz has used.

Many problems enter into the digestion of grafts in the stomach. Is it really a process of digestion which causes the perforation in the grafts? In the first six cases there was not this perforation, and then in the later cases the so-called digestion occurred with perforation. What has stomach motility to do with the graft; what has the chemistry of the stomach contents to do with the graft; what has the position of the graft to do with the success of the operation? Doctor Koontz said he had placed the grafts on the cardiac curvature. It is possible that some animals can have a hypermotile stomach just as human beings have, and one can understand how hypermotility would prevent the taking of the graft. A dog may have a hyperacidity, and this may prevent the taking of the graft. I hope Doctor Koontz will study the taking of the grafts under these various circumstances to discover how he might control it; for instance, by giving atropin for a time or by changing the chemical contents of the stomach in some way.

Doctor Koontz has very wisely, I think, kept from indicating any clinical application of this method at present.

In large callous ulcers on the lesser curvature might not the use of such a graft as Doctor Koontz has suggested help us? It would seem unlikely that the grafts could ever be used in the neighborhood of the pylorus, because of the motility of that region. I was interested in the manner in which the mucosa covers over the grafts. This can be seen at any time in repairing ulcers, by removing the submucosa from the ulcer and covering it over. Within a short time it is difficult to find the place where the submucosa has been removed.

In the production of experimental ulcers, where we have a foreign substance inclosing that defect, Doctor Koontz has not found the development or recurrence of the ulcers. The problems there are even more complicated than is repairing defects with the inert fascia.

Another interesting thing which Doctor Koontz brought out privately to me and did not mention particularly in the paper, is the fact that there appear to be many less adhesions over the peritoneal surface of the graft than over similar surfaces operated upon in the usual way.

Dr. Koontz (closing).—I am much interested in what Doctor Hughson said about the reason for the grafts not taking in some instances. I hope to carry on the work and find out why there was no digestion in some instances, while in others there was digestion.

I purposely left the practical applications of the work out of the paper, for it had seemed to me that they would be rather limited. I presented the work to show the fundamental biological phenomena involved.

OBSERVATIONS ON AIR UROGRAPHY*

By RAYMOND THOMPSON, M.D.,
and
LESTER C. TODD, M.D.,
Charlotte, N. C.

The study of the internal structure of the drainage system of the urinary tract has become one of the most important and widely used methods of examination in urology. In order to record this internal structure on the radiographic film it is necessary to inject a contrast medium: either an opaque solution, which gives a positive shadow of density, or a gas which gives a contrast negative shadow. While the opaque solutions have found wider application and their use has been extensively employed and studied, there are certain features of the use of the gaseous media which appear to be worthy also of further investigation.

*Read in Section on Urology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

Burkhardt and Polano,[1] in 1907, while working with oxygen injections into the bladder, first suggested the injection of oxygen into the kidney pelvis. Cole,[2] in 1910, described a method of inflating the kidney with air and mentions its uses. Granger,[3] in 1916, and Lim,[4] in 1921, described the use of gas in pyelography. Thompson,[5] in 1922, described a method of using oxygen for this purpose. Since 1921 and following Corelli, Sordelli and Finochietto's[6 7 8] work on the peri-renal injection of gas, a quite voluminous literature has been produced on this subject, especially in France, South America and Germany. Following this, the use of gaseous media in the radiographic examination of the bladder came into greater prominence. Pfahler,[9] Cohen,[10] and Ballenger, Elder and Lake[11] especially have used air as a contrast medium in cystograms.

Our attention was attracted to the use of oxygen injections to outline the kidney itself by the work of Corelli and Sordelli, of Buenos Aires, in 1921. We tried this method for a short period of time and were convinced that it did accomplish the clear-cut delineation of the kidney. We found that the method had a very limited scope in our work and did not use it to any great extent. Shortly thereafter, in 1922,[12] while experimenting in animals with the use of our special pressure gauge in pyelography, we were impressed with the possibilities of air as a contrast medium.

Since that time we have used air as a medium in the internal examination of the human bladder, ureter and kidney 122 times in 116 patients. We have had no reaction whatever, but the pressure of injection has always been controlled with our special manometer attached to the injecting syringe. From our previous work with the effects of the pressure used during injection of the kidneys, we are convinced that it is not wise to use a pressure greater than 50 mm. of mercury. Most injections can be made at a much lower pressure than that. This control of the pressure, we feel, is the main reason why our patients do not suffer reactions following kidney injections.

While most of our urographic examinations are made with the opaque media, we have learned to choose certain cases in which the air injections have definite advantages.

Advantages.—Its best uses are, first, in outlining stones in the ureter not otherwise demonstrated; second, to show the exact location and character of stones in the kidney pelvis and its

Fig. 1 Fig. 2 Fig. 3

Fig. 1. Pyelogram.—Low pressure air injection at 20 mm. Hg. measured with the special manometer for controlling pyelographic injections. See Fig. 13.

Fig. 2. Uretero-pyelogram with low pressure injection. Visualization of entire ureter and pelvis. Ureteral instillator with metal bulb tip used through which air was injected.

Fig. 3. Right urogram with low pressure air injection through a Woodruff catheter. At operation an aberrant vessel was found at the point of ureteral stricture seen in this case.

sub-divisions; third, for kinks, strictures or other pathological conditions of the ureter. It also has some diagnostic value when growths of the kidney pelvis and diverticula of bladder and intravesical growths are present.

It is an outstanding observation of ours that patients suffer less both during and after the pyelographic injection when air is used than when the opaque solutions are used, although the pressure may be properly controlled in both instances.

It, furthermore, does away with the irritating action of an hypertonic solution on the mucosa, which is in itself a cause of some degeneration of the tissues coming in contact with the solution with resultant impairment in function.

By far its greatest advantage is in the demonstration of ureteral calculi, especially those calculi overlying bone, which are not rendered visible in the x-ray film by other means. We have had several cases of just this type.

Limitations.—While one must admit the possibility of air embolism, especially if the pressure is not controlled, we have seen no unfavorable symptoms in any case. Cohn,[13] in 304 examinations, had no sequelae suggesting embolism. Emphasis must be placed upon the importance of controlling the pressure adequately with this medium as well as with the opaque solutions.

Intestinal gas causes interference and special effort must be made to eliminate this in the thorough preparation of the patient.

The shadow cast by air is less distinct in heavy patients.

. The detailed visualization of the minor calyces is less perfect.

Technical Suggestions.—The preparation for air urography is the same as when the more dense media are used. No. 6 ureteral catheters are preferable to No. 5, but not essential. Woodruff's[14] special catheter with whale bone guide, which has been announced recently, would appear to be useful. We have used a similar catheter without the guide. A better filling above the bladder may be obtained by the use of a ureteral instillator with bulb tip, because the single opening is at the very tip and permits easier and more direct injection of the air. Our pressure gauge is used to control pressure and the air is injected by means of a bulb asepto syringe No. 5030 with a metal tip adaptor which fits the pressure gauge. Connection is made between the gauge and the ureteral catheter by means of a universal pyelographic adapter (Fleischer) into which the shaft of any

Fig. 4 Fig. 5 Fig. 6

Fig. 4. Contrast cystogram. Preliminary injection of 5% sodium bromid solution, bladder then emptied and then refilled with air at 10 mm. Hg. pressure. Bladder diverticulum.

Fig. 5. Air cystogram. Carcinoma of inferior-anterior surface of bladder.

Fig. 6. Left urogram, air injection. Stone impacted in ureter at arrow with dilatation above.

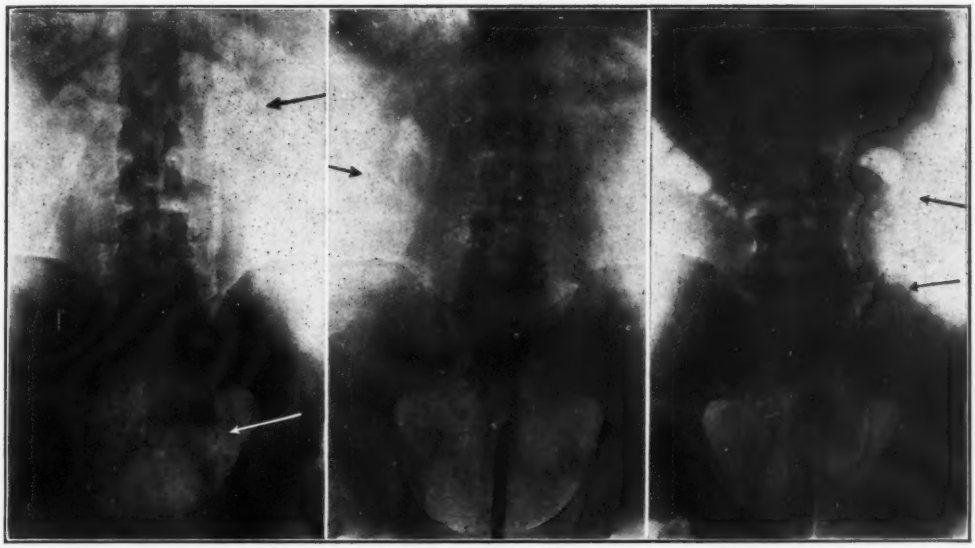

Fig. 7 Fig. 8 Fig. 9

Fig. 7. Right urogram, air injection. Stone in ureter near lower end and another stone in pelvis. Dilatation of ureter, pelvis and calyces. The stone in ureter was not seen in the plain radiograph.

Fig. 8. Left urogram, air injection. Small stone tip of inferior-most calyx.

Fig. 9. Right urogram, air injection. Stone in ureter at catheter's tip; another stone in lower calyx. Both of these stones were overlooked in the plain radiogram, although careful search was made, especially for the one obstructing passage of catheter.

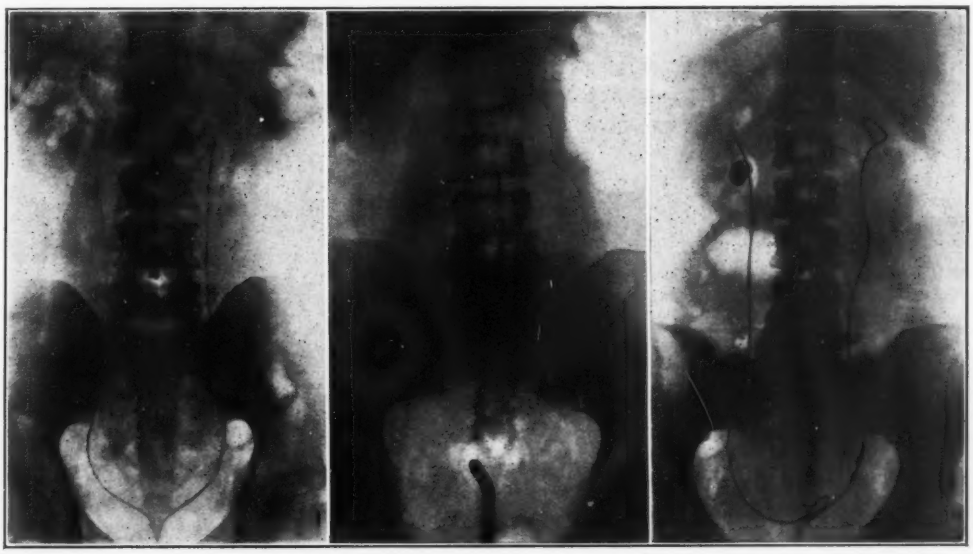

Fig. 10 Fig. 11 Fig. 12

Fig. 10. Left urogram. Three distinct stones seen in kidney pelvis. Plain radiogram showed one indistinct shadow.

Fig. 11. Right pyelogram. Hydronephrosis, low pressure air injection.

Fig. 12. Left pyelogram. Exact size and location of stone relative to the subdivisions of the kidney pelvis was determined preliminary to pyelotomy.

ureteral catheter from Nos. 5 to 11 in size slips and fits tightly. Pressure is kept below 50 mm. of mercury and filling is continued until the patient feels a distinct fullness in the region of the kidney. It is not essential to continue the injection to the point where the patient complains of severe pain, as our best urograms were secured when undue distention was not attempted. As soon as adequate filling is accomplished, the radiograph is made with moderate pressure maintained. At once the table is tilted with the patient's head lowered and the air is allowed to escape as indicated by the disconnected end of the catheter immersed in water. In this way one can judge when approximately all of the gas has been recovered, as the gas escapes promptly under these conditions. We have demonstrated this with subsequent radiographs.

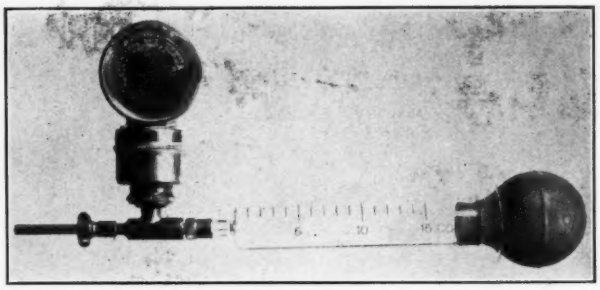

Fig. 13

Todd's pressure gauge for controlling pressure of radiographic or therapeutic injections (either liquid or gas) into the urinary tract. Two distinct improvements have been made in this instrument: a metal universal adapter to fit varying sizes of ureteral catheters and a bulb syringe with slip-joint metal adapter by which the solution or air may be injected.

When injections are made into the bladder we have used an ordinary soft rubber catheter and injected at lower pressure (10-20 mm. of mercury) by means of a large bulb syringe, the pressure being controlled with the same pressure gauge.

COMMENT AND CONCLUSIONS

We have found the best uses for this additional method of urographic examination in the following conditions:

(1) *Ureteral Stone.*—Stones ordinarily invisible either because of their composition, size or location overlying bones, are visualized by this method better than by any means we have used. Furthermore, confusing shadows such as sclerosed or calcified glands along the course of the ureter are more readily differentiated and proven to be outside of the ureter's lumen.

(2) *Kidney Stone.*—The exact location and size of kidney stones in relation to the subdivisions of the pelvis and calyces can be more readily demonstrated with air, which is an important pre-operative aid. Also in the kidney, invisible stones are demonstrable by this means.

(3) *Ureteral Lumen.*—Kinks and strictures are readily demonstrated by this method.

Urographic examination of this type is less painful to the patient and if the pressure is properly controlled there seem to be no injurious after-effects. We have had no bad results in 122 examinations of 116 patients.

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DISCUSSION (*Abstract*)

Dr. K. E. Montgomery, Asheville, N. C.—We generally use lipoiodin or neo-silvol for pyelographic work. Lipoiodin gives a good outline of the calices and pelvis of the kidney and kidney tissue in front of the solution, which is important in the study of neoplasms or tuberculosis of the kidney. Rupture of miliary tuberculosis areas into the calices are easily detected by a haziness in front of the pyelographic medium. It is true that stones may not show through this medium.

Some years ago Dr. Todd injected sodium iodid into rabbit kidneys and proved that it was very irritating to

the kidney structure. I have used air only in doing cystograms, and this, with an opaque medium, shows up diverticula very distinctly. Air medium shows up bladder tumors clearly, and stones and pressure from outside the bladder. It is almost impossible to free some patients of gas, and in those cases it is very difficult to interpret the pictures.

Dr. Todd has devised an instrument for estimating pressure of the medium injected into the ureter and pelvis, which lessens the likelihood of injury to kidney structure. With this instrument the operator can keep an even and accurate pressure.

The chief advantage of air medium, I believe, is the fact that it shows up very distinctly stones in the urinary tract, particularly if they overlie bony structures, also strictures or obstructions of the ureter which cannot readily be passed by the opaque solutions. It also does away with the irritating effect of the hypertonic solutions.

Dr. Edgar G. Ballenger, Atlanta, Ga.—We have had no experience with air pyelograms but for six years have employed air in bladders to afford contrast in demonstrating intravesicular prostatic enlargements. During this time we have been convinced of the value of air cystograms and of their harmlessness when properly done.

At first pictures were taken both from the front and back. Those made, however, with the patient lying on his back were often unsatisfactory and now, unless calculi or diverticula are suspected, only the exposure with the patient lying face downward is made. The x-ray tube is directed toward the rectum and through the pelvic basin. The line is not at right angle but 15 or 20 degrees toward the feet. A pressure gauge connected between the syringe and the catheter shows that, when the patient is reclining, not more than 20 or 30 mm. of pressure is necessary to afford distention with 100 c. c. of air. Twenty c. c. of a one per cent solution of novocain are injected through the catheter, after the urine is drained, and allowed to remain in the bladder five minutes before air is injected. The air is allowed to escape before the patient gets up.

The normal prostate is never shown in the bladder shadow. While valuable information is obtained from air cystograms and they are of additional use for demonstration to the patient, his family, and for comparison with later pictures, cystoscopy also may be advisable to obtain further information.

Cystoscopies are more disturbing, however, than are cystograms and owing to the age and more or less enfeebled condition of the patients with prostatic obstruction, cystoscopic examinations are not employed as a routine but rather, when needed. Enlargement of the median lobe and the intravesical snout-like masses have been found to cause obstruction probably more frequently than have hypertrophied lateral lobes palpable by digital rectal examination. The clearness with which intravesical enlargements are shown in air cystograms not only is of value in making the diagnosis but greatly assists us in making a decision as to whether an operation is required and also in deciding what the probable result will be without prostatectomy.

Dr. Courtney W. Shropshire, Birmingham, Ala.—We all know the discomfort, pain and trouble patients encounter from pyelograms, particularly when bilateral pyelograms are done. I noticed that in two instances Dr. Thompson did a double ureterogram, showing that this can be done with less danger and irritation than with opaque solutions.

Dr. Montgomery spoke of the difficulty of getting the intestinal tract free of gas. I have not found great difficulty in that respect.

At the Norwood Clinic we use the following preparatory treatment for a cystoscopic examination: at 8:00 P. M. before the morning that cystotomy is to be performed, the patient is given one ounce of castor oil with orange juice. He has no breakfast. An hour before the hour of cystoscopic examination, he is given a high saline enema, two glasses of water, and 1 c. c. of surgical pituitrin. One-half hour before time of cystotomy the patient is given a low sterile enema, and two glasses of water. Immediately before the patient is placed upon the cystoscopic table, he is given two glasses of water. This technic, in our hands, has been most satisfactory, and the patient's intestinal tract is practically free of gas.

Air cystograms bring out certain facts that cannot be demonstrated with the cystoscope. They show up well the infiltration which we cannot get except by cystograms, and there is much less irritation from the air than from other media.

Dr. H. W. E. Walther, New Orleans, La.—I am interested in this work but fearful of embolus. I saw a death occur in the service of a confrere who was filling the bladder with air for the purpose of cystostomy. We had filled bladders with water for years before it was said that air was better. That morning very gently the physician distended the bladder with air, and before he could take his scalpel in hand the patient breathed his last. That was an embolus death, proved by autopsy, and I immediately stopped using air. About a year later I did a little oxygen pyelographic work. I found it was much more painful than any opaque solution I had ever used, and abandoned it. I cannot feel that air pyelo-ureterography can be any less painful, particularly if the solutions used be warm. I have used warm solutions in every distension, and get no pain whatever and no serious reaction of any type. New Orleans is one of the cities in the country where we do universal double pyelography, and we have no trouble, particularly when we use the solutions warm and do not use too much. The work demonstrated is interesting and may be safe, but I wish you to remember the possibility of embolus. With catheters we cannot tell whether we shall encounter a raw surface.

Dr. A. Mattes, New Orleans, La.—I know of no safer way of determining the presence of calculi where we are unable to pass a catheter than by using air. I have used opaque substances in these cases, which often do not leak out for several hours. We may wait too long before doing an operation and lose the kidney, in cases where we fear pyelography and do not know the degree of upper urinary dilation.

Dr. Monroe Wolf, New Orleans, La.—Some three years ago Dr. Granger, radiologist at Charity Hospital, New Orleans, advised me against the use of air as a pyelographic medium because of the difficulty in differentiating the injected air from gas in the intestinal tract. I am sure that with the preparation and technic outlined to us today we shall gain valuable information in cases where this method is indicated.

I have often injected a small amount of air through ureteral catheters that failed to drain after they had been aspirated, without any ill effects.

I have been using air as a medium for distending the bladder in cystostomies with no reason to regret it up to the present time.

Dr. R. E. Van Duzen, Dallas, Texas.—Dr. Hickey of Ann Arbor, Michigan, suggested the use of pituitrin for removal of gas in the intestines one hour before taking the x-ray. This might be used in cases of questionable ureteral calculi, but not in ureteral spasm or stricture.

Dr. T. M. Davis, Greenville, S. C.—There undoubtedly is danger of air embolism after air injections. I have seen articles by authors who have injected large amounts of air into animals' veins without deleterious effects. I recently had a patient, a young lady, in whom I certainly brought on symptoms of air embolism from a very small bubble of air given during the intravenous injection of phenolsulphonephthalein. It may be easy to do this where there is a closely related venous supply as in the renal pelvis, and renal blood supply. In cases of renal obstruction due to stone or other cause it will be necessary to pass the obstruction and remove the retained urine before a successful air pyelo-ureterogram can be made. This is desirable but not absolutely necessary with opaque medium. I think that the opaque medium and the wax-tipped catheter will give as clear a diagnosis in ureteral calculus as air urography.

I was glad to hear Dr. Mattes say that they invariably do a bilateral pyelogram in New Orleans. I have been doing bilateral pyelograms, using sodium iodid, in about 80 per cent of my cases for several years without any untoward results.

Dr. A. J. Crowell, Charlotte, N. C.—Because of the fact that deaths have been reported following cystograms, Drs. Thompson and Todd went at this work with great precaution, using the pressure gauge in every case with gratifying results both as to the insignificance of the pain produced and as to the definition obtained in the picture. I suspect the pressure was not carefully guarded in the cases of death reported from the use of air in cystograms and pyelograms. I witnessed a death following a collargol pyelogram but the pressure gauge was not used in that case. The pressure is of great importance, whether an opaque medium or gas is used.

Dr. O. L. Suggett, Asheville, N. C.—I should like to hear some remarks regarding the imperviousness of the urinary tract to air in comparison with the opaque media. There is no question that air affords a beautiful picture, as was shown in the October *Journal of Urology*, by my friend Gilbert Thomas. From a personal experience I seriously question the statement that air in the bladder is less painful than liquid.

Dr. Bransford Lewis, St. Louis, Mo.—About 1900 I devised an instrument for air cystoscopy, an improvement on those of Dr. Kelly, who had devised such apparatus for use in women. I did not use air in the ureters at any time, but have used it in the bladder on many occasions for the purpose of dilating it and getting a better view. Dr. Kelly obtained the same effect in women by changing the position. I used a little pressure with this technic, in both men and women, and my experience was that it was very painful, so much more so than with the fluid medium that a little later I gave it up and used instruments with lenses, with much more satisfaction.

I have observed reports during the past twenty-five years of several deaths in connection with the use of air in the urinary tract. I am glad Dr. Walther mentioned the case he saw. I am not convinced of its harmlessness; for air will infiltrate and cause embolism in some instances.

Dr. Thompson (closing).—The use of air in the pelvis of the kidney and the ureter was started since we devised the pressure gauge. We have not had much pain and we believe, as was stated before, that the pressure has much to do with it. We have heard of several deaths from the use of opaque solutions. We have written to several different places, including the office of the Surgeon-General, but did not get a reply that a death had been reported in the literature following the use of this technic. We have had no bad results and are very enthusiastic over it.

Dr. Montgomery asked about the difficulty of filling the pelvis. We have had no trouble with that for we can gauge it just as we would a solution, and we use 5 or 10 c. c. as with a solution.

The Kelly cystoscope has been used for a long time and no death has been reported from using the air.

Dr. Walther also spoke of the pain, but I do not see how air if properly injected can cause as much pain as do the hypertonic solutions.

AUTOPSY FINDINGS IN TUBERCULOSIS*

By ALFRED BLUMBERG, M.D.,
Oteen, N. C.

An effort is made to obtain permission for post-mortem examination in each available case at the United States Veterans' Hospital at Oteen, though our attempt is not always crowned with success. Refusal as a whole is less due to racial or religious scruples than to the fact that relatives and friends of the deceased reside at a place distant from the Hospital. In such cases we have to ask permission for post-mortem examination by telegram. This is less satisfactory than personal contact, when permission is obtained with greater ease. Because of these difficulties we learn to value each opportunity offered and try to utilize the available material to best advantage. Post-mortem examination should not be considered a mechanical procedure, merely of interest to the pathologist. As a matter of fact, there is a tendency with beginners to over-estimate the mechanical part. To read gross tissue changes, to correlate findings and interpret the clinico-pathologic phenomena is an art which can and should be acquired equally by general practitioner and specialist. Erdheim, of Vienna, flatly states that of the two, microscopic and macroscopic, pathologic anatomy, the latter is the greater art. To this I should like to add my belief that it is easier to acquire the knowledge of gross pathologic anatomy, provided one makes good use of his

*Clinic, General Clinical Session, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

opportunities and facilities are available to confirm by microscope the macroscopic diagnosis.

Arrangements could be made in all small communities to invite every physician whenever an autopsy is performed, and a general discussion of the findings should be of utmost value to all.

There is quite a tendency with those who do post-mortem work to look for unusual findings and rare conditions whenever the antemortem diagnosis is questionable. This tendency should be overcome. In doing the autopsy it is not the purpose to find the curious or odd, but to demonstrate the pathologic changes present and from these findings to build up the structure which explains phenomena observed during the period of illness of the deceased. No matter how often a common condition presents itself, it should be a subject of careful examination if for no other reason than for the purpose of reviewing the condition frequently enough to make a lasting impression upon all present.

In our hospital the chief findings are those of pulmonary tuberculosis and its complications. It is one of the ward surgeons who is the associate of the pathologist during the post-mortem examination. Preference is given to the physician whose patient came to autopsy. The details of the findings are demonstrated to all, but first of all the personal and clinical history, clinical and laboratory findings, as well as the diagnosis are given to those present. The roentgenologist demonstrates the details of the films and the pathologic findings are then compared with the clinical-roentgenologic and laboratory findings. A general discussion follows either at the termination of the post-mortem examination or in special conference. One may assume that in time a certain monotony will dampen the interest of those who see the same condition often. In reality, it is to the contrary. The fact that a single disease can give rise to this variety of manifestations, clinical and pathologic, is plain only to those who see the cases as often as we do. Unusual and unexpected findings, of course, occur at times. Our endeavor, however, is to know and learn as much of tuberculosis as possible. To go into all details of what is found in our series cannot be within the scope of this clinic. I shall attempt to demonstrate a few of the more frequently encountered or outstanding lesions.

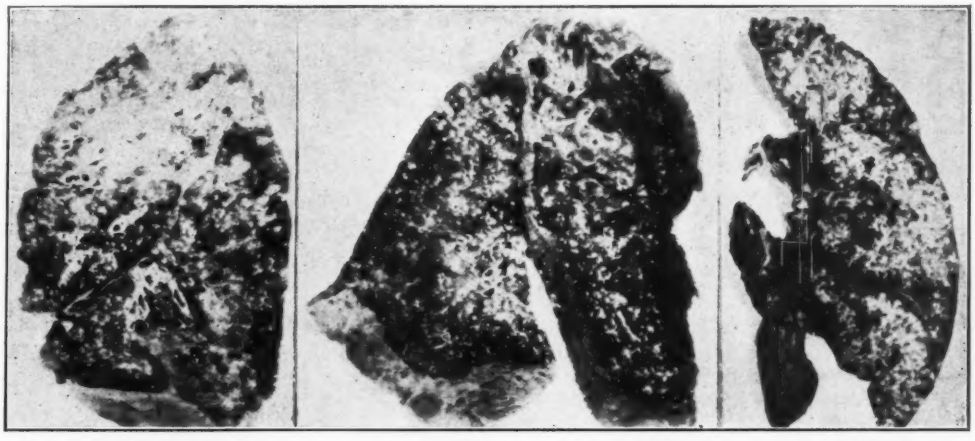

Fig. 1 Fig. 2 Fig. 3

Fig. 1. Above the center of the specimen is a large white area of caseation with broken interior. Close to it is an irregular, ragged, excavated area with a collapsed cavity on the right. Miliary tubercles are readily recognized elsewhere as small white foci. There is also broncho-pneumonia. Nearly all the vessels show tubercles in their vicinity.

Fig. 2. The specimen shows the two lobes of the left lung. In the apex multiple cavitations are seen. There is also definite fibrosis present; fibrous infiltration continues as a diffuse process throughout that area. The rest of the specimen shows a number of quite discrete tubercles with conglomerate tubercles toward the periphery. In addition to this miliary deposit there is also tuberculous broncho-pneumonia present.

Fig. 3. This specimen shows varying stages of caseation. The more intensive white areas represent the more advanced stages. Miliary foci are seen in the periphery.

Fig. 4 Fig. 5 Fig. 6

Fig. 4. In the specimen discrete miliary tubercles, conglomerate tubercles, diffuse tuberculous areas and caseous foci are seen. These are all incorporated in a pneumonic background. In the upper left lobe there is a cavity in the floor of which necrosis is seen.

Fig. 5. There is extensive fibro-caseation in the entire upper lobe of this specimen. In addition, a large cavity is seen in the apex and smaller ones in the lower regions. Diffuse areas of pneumonia are seen in the lower lobe; the pleura is thickened and ragged.

Fig. 6. The specimen shows fibrosis in the form of whitish bands within the upper portion. Such fibrous bands of lesser dimension are seen through the lung. Irregular, circular, caseous foci at times surrounding broncheoli are seen, especially in the lower half of the picture. In the upper half a cavity in the process of formation is seen. The peribronchial lymph nodes show anthracosis.

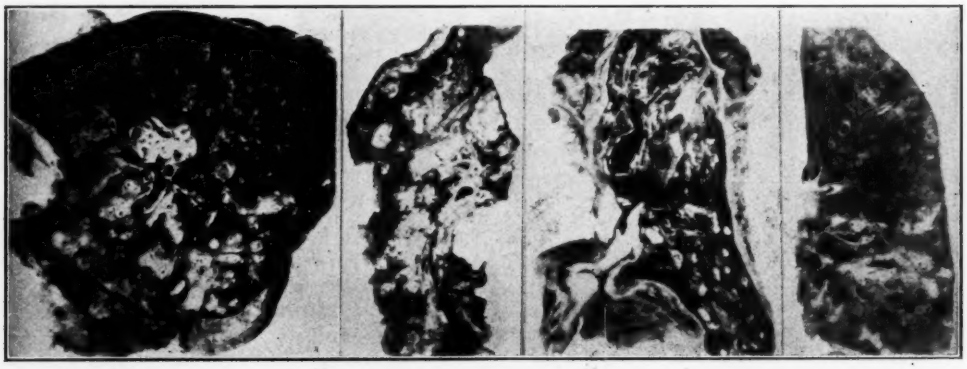

Fig. 7 Fig. 8 Fig. 9 Fig. 10

Fig. 4. In the specimen discrete miliary tuover the cut surface. In addition to the pneumonic process, white patches of tuberculous foci are seen. Ever so often they surround broncheoli and blood vessels. Some emphysema is also present.

Fig. 8. This picture shows the result of retraction due to pneumothorax. The irregular outline from the apex down represents a large cavity, the walls of which show tuberculous infiltration and large caseous areas.

The tuberculous process seen in the rest of the lung is quite extensive.

Fig. 6. The specimen shows fibrosis in the form of whitish bands within the upper portion. Such less. The pleura is greatly thickened. In the upper left the walls of a collapsed cavity are seen. Tuberculous foci are present throughout.

Fig. 10. This specimen shows an almost structureless condition as the result of the presence of croupous pneumonia, probably due to tubercle bacilli. The caseous process is represented by white areas.

In closing I wish to state that the photographs were prepared by Dr. L. H. Prince, Army Medical Museum, Washington, D. C., while the lantern slides were made by Mr. H. L. Byrd, of the Department of Roentgenology, at this station.

UNUSUAL TYPES OF PYLORIC OBSTRUCTION*†

By JULIUS FRIEDENWALD, M.D.,
and
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Baltimore, Md.

In a recent publication on pyloric obstruction due to some unusual causes, we[1] pointed out that while pyloric stenosis is usually due to ulcerations associated with cicatricial contraction and carcinoma, many other causes, though less frequently, may lead to a similar condition.

It is our object in this paper to call further attention to some of these unusual types, as well as to point to another group to which insufficient attention has likewise been accorded.

As has already been pointed out, these cases may be divided into two groups: those in which the stenosis is produced from without the pylorus, and those in which it occurs from within. In the first group are included forms due to adhesive processes which may have their origin in the stomach or neighboring organs, or be due to pressure of tumors originating in the pancreas, liver, gall bladder, intestines, lymph glands, or mesentery.

In the second are noted the forms due to thickening of the gastric wall which one finds in hypertrophic pyloric stenosis, as well as in linitis plastica, and those due to pylorospasm; occasionally those cases of gastric stasis caused by protracted and advanced forms of gastric atony, as well as some unusual cases of cicatricial pyloric stenosis entirely and permanently overcome without surgical intervention.

GROUP I

(1) *Pyloric Stenosis due to Adhesions.*—These adhesions are ordinarily perigastric or pericholecystitic. (a) Perigastric adhesions will be discussed first.

Perigastric adhesions may be localized over a small area of the stomach, or may be extensive. When they are localized the pylorus may be especially involved. The adhesions may result from any of the following conditions: ulceration (gastric or duodenal); gall bladder lesions; malignant diseases; pancreatic disease; epigastric hernia and traumatism. In consequence of this formation, the contour of the stomach may become altered and the pylorus narrowed. The significance of these adhesions in the etiology of the affection is not at all times easily determined.

When symptoms occur or recur following operations, the cause is ordinarily attributed to adhesions. There may be no positive evidence for this assumption, however, except that adhesions are known frequently to follow operative procedures in the abdomen. Localized adhesions frequently lead to sharp kinking at the pylorus or duodenum, thus producing a certain degree of obstruction by narrowing the lumen. The adhesions may cause pain, as well as obstruction, when traction is produced upon them, when the stomach is distended with food or on movements of the body, as in walking or in any other exercise. Violent exertion is not infrequently the immediate cause of aggravated forms of obstruction in these cases.

The diagnosis of pyloric obstruction due to perigastric adhesions is frequently difficult. The history is always of great significance. The character and location of the pain and its relation to food and exercise must always be taken into consideration. It must be remembered that adhesions from gastric ulcer are not uncommon. Of greatest importance in the diagnosis are the obstructive signs revealed by means of fluoroscopy and the x-ray examination. In many instances the obstruction may be partial and it is only by means of these methods that the condition can be definitely determined.

(b) Pericholecystitic adhesions are usually the result of inflammatory processes in the gall bladder wall involving the peritoneal layer, or they may be due to ulceration of the duodenum or stomach. As a result of these adhesions between the gall bladder, duodenum or pylorus, stenosis of the pylorus is produced which may lead to kinking, strangulation, or even acute obstruction of the pylorus.

Of great importance in the diagnosis of gall bladder adhesions associated with pyloric obstruction are the roentgen ray findings. By means of this method of examination one can determine deformities of the stomach with interruption of the normal peristalsis causing pylorospasm with an escape of but small amounts of barium. When this condition is marked the roentgen ray will reveal a sixteen to eighteen-

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*Read in Section on Gastro-Enterology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

†From the Gastro-Enterological Clinic, Department of Medicine, University of Maryland.

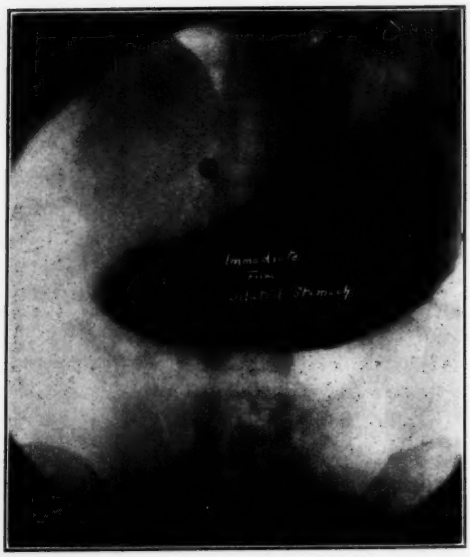

Fig. 1, Case 2

Immediate x-ray film, showing a dilated stomach.

hour retention. The diagnosis of pyloric obstruction due to pericholecystitic adhesions is not always simple. A careful study of the clinical history of the case, together with the x-ray findings, however, will usually lead to the correct diagnosis. A history of a previous abdominal operation will often greatly aid in arriving at the correct conclusion.

(2) *Pyloric Obstruction Produced by Pressure from Without the Stomach.*—The pylorus may at times become obstructed by pressure from tumors originating in neighboring structures such as the liver, gall bladder, intestine, pancreas, lymph glands, or mesentery. The following is an example of a pancreatic carcinoma causing stenosis of the pylorus by external pressure.

Case 1.—S. B., a man of 28 years, had been affected for the preceding five months with indigestion, consisting of nausea, vomiting, eructations, acidity, flatulence and abdominal pain. He vomited large amounts, especially at night, and often 6 to 12 hours following meals. The vomitus usually contained food matter taken on the previous day. On examination the abdomen was found to be soft and no masses could be detected. Occasionally peristaltic waves were visible in the region of the stomach. There was considerable tenderness in the epigastrium and in the lower abdomen. The gastric secretion showed a total acidity of 29, and free hydrochloric acid, 9. Two independent x-ray investigations of the gastro-intestinal tract revealed a definite pyloric obstruction with stasis. There was no evidence, however, of ulceration.

At operation the cause of the obstruction was discovered to be a carcinoma of the head of the pancreas, producing pressure upon the duodenum and pylorus. A gastro-enterostomy was performed. The patient recovered from the effect of the operation, but soon developed a palpable mass in the abdomen, became jaundiced, and died as the result of the pancreatic growth.

GROUP II

(1) *Hypertrophic Pyloric Stenosis.*—This affection in adults may be the result of a number of conditions. It may follow cicatrization of an ulcer or corrosion of the pylorus due to irritant poisons or to a chronic gastritis. On account of its frequent association with chronic gastritis, Boas has termed it stenotic hypertrophic gastritis, a condition much resembling that described by Tilger, Oettinger, and others, as stenotic hypertrophy of the pylorus. Stenotic hypertrophic gastritis is generally observed at a comparatively young age, though Tilger has reported cases in individuals at the age of 50 to 70 years. However, it is quite possible that the disease may have existed for a long period of time before the actual condition was recognized.

Fig. 2, Case 2

Shows an eighteen-hour retention; arrows indicate a pyloro-duodenal lesion.

Fig. 3, Case 2
Same case shows a normal size stomach four years later.

The clinical manifestations of stenosing gastritis are identical with those of a chronic gastritis until the symptoms due to the obstruction present themselves. At first there is a feeling of pressure and fullness with distention, eructations and pyrosis. As the stenosis progresses, the symptoms increase and signs of motor insufficiency develop in the form of stagnation with vomiting often of extremely copious masses. The general health of the patient begins to fail, weakness and loss of weight ensue, and constipation becomes obstinate. The pylorus may become so thickened as to present a smooth, sausage-shaped palpable tumor. In most instances there is a decreased secretion of free hydrochloric acid. The diagnosis of stenosing gastritis is made from a history of long duration of the disease with the signs of chronic gastritis, together with the presence of symptoms of pyloric obstruction. The absence of free hydrochloric acid and the presence of a thickened palpable pylorus are additional evidence in its favor.

(2) *Pyloric Stenosis Occurring in Linitis Plastica.*—While linitis plastica was first described by Andral in 1834, it remained for Brinton, in 1864, to name the disease and more fully to point out the pathological changes occurring in the stomach in this affection, emphasizing especially its inflammatory nature. While the evidence in favor of the inflammatory origin of linitis plastica has been favored by many in recent years, numerous cases have been recorded which were observed to be definitely of a malignant type.

Whatever the character of the cells may be, the production of this condition is apparently due to an increased proliferation of connective tissue invading the coats of the stomach, especially the submucous layer leading to an extreme reduction in the size of this organ. When the pathologic change is limited to the pylorus or the pylorus is more fully involved in the general fibroid thickening, stenosis takes place with dilatation of the stomach.

The symptoms at first are insignificant and indefinite; epigastric distress, loss of appetite, and eructations, are noted. These symptoms become progressively more marked, and finally signs of obstruction are observed with pain, vomiting and anemia. The x-ray reveals the presence of a contracted stomach with pyloric obstruction. The gastric contents present a diminished acidity and more frequently a true achylia and even lactic acid may be present.

(3) *Spastic Pyloric Stenosis.*—In some instances when erosions, fissures or mucosal ulcers occur at or in the neighborhood of the pylorus, pylorospasm may be induced which occurs at the height of digestion, producing pain, nausea and

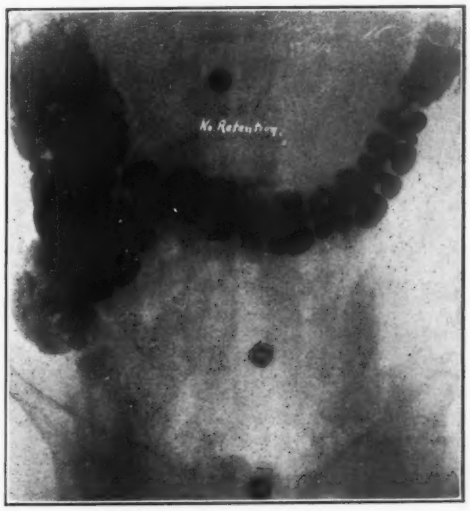

Fig. 4, Case 2
No retention four years later.

Fig. 5, Case 5

Shows slightly dilated stomach. Immediate film.

vomiting. These spasms may be intermittent or continuous, and may finally occasion spastic occlusion of the pylorus with retention of gastric contents. Boas has termed this condition pyloritis ulcerosa, thus distinguishing it from cicatricial pyloric stenosis. In the former affection the symptoms gradually subside under proper medical treatment and the patient may recover fully and digestion return to normal, which is impossible in the latter condition.

The presence of spastic pyloric stenosis is indicated by symptoms of ulceration with signs of gastric hyperacidity, together with gastric retention, which under favorable treatment gradually disappear and return to normal.

(4) *Muscular Stasis Insufficiency (Atonic Dilatation).*— It is generally admitted that gastric retention (stasis) rarely occurs as a result of atonic dilatation of the stomach, though authentic cases of this condition have been recorded. Schlesinger reports a series of cases of this type in which the motor insufficiency was so marked as to lead to gastric retention, even though the pylorus itself remained fully patent. According to Cohnheim, the following signs are indicative of this condition, namely: the asthenic habitus of the patient, the nervous stigmata, enteroptosis, especially a left-sided stomach; signs of stagnation, subacidity and sarcinae in the gastric contents; the chronicity of the disease; eructations of sulphuretted hydrogen occurring without serious errors in diet; symptoms of fullness and distention without the characteristic pain following food that is found in ulcer; the relief afforded by a dry diet, and the absence of peristaltic waves which are commonly revealed by the x-ray in instances of pyloric stenosis. To these signs Boas adds a distinctive method of differential diagnosis, in that the duodenal tube will without difficulty pass through the pyloric orifice.

(5) *Pyloric Stenosis Overcome by Medical Management Without Surgical Intervention.*— It is this type of pyloric stenosis to which we wish especially to draw attention. Sippy,[2] in the description of his treatment for ulcer, maintains that, as the result of the constant protection of the ulcer from the digestive juice contact, pyloric obstruction is likely to yield promptly. This occurs not only in those instances in which the obstruction is due to spasm of the pyloric muscle and acute inflammatory swelling, but also in approximately half of the cases due to actual tissue narrowing.

In a paper presented at a meeting of the Southern Medical Association by us[3] in 1919

Fig. 6, Case 5

Eighteen-hour retention; arrows indicate lesion at pyloro-duodenal junction.

Fig. 7, Case 5
Same case shows normal size stomach five years later.

on the "Sippy Treatment of Peptic Ulcer," the following statement was made:

"It is remarkable how obstructive conditions due to pylorospasm or acute inflammatory swellings, or how partial obstructions yield to this method of treatment. We have not been able to convince ourselves notwithstanding Sippy's conclusions that any method of treatment other than surgical can be of permanent help in cases of pyloric obstruction produced by marked organic disease."

During the past five or six years, however, we have observed five cases in which pyloric obstruction of a rather aggravated type existed which definitely yielded to medical management. All of these cases were of long duration, presenting many typical signs of the disease, as well as positive x-ray findings; so that there can be no question that the condition must have been definitely due to actual tissue narrowing. It is interesting to note that Lucas[4] has likewise recently called attention to a similar condition.

The following case histories illustrate this type of pyloric obstruction.

Case 2.—G. C. G., a man, aged 40 years, consulted us on August 1, 1926, on account of a digestive disturbance of ten years' duration, the principal symptoms being a gnawing sensation in the stomach relieved by food and soda, the discomfort returning several hours later with acidity, flatulence and constipation. There have been periods of relief lasting several months at a time. The present illness began several weeks before we saw him. In addition to the above-mentioned symptoms, the patient now, for the first time, experienced nausea and vomiting, the vomitus at times containing food taken the day before. The physical examination was negative except for a tender area in the epigastrium and a suggestion of visible peristaltic waves over the abdomen. The laboratory tests gave entirely normal results. The gastric analysis one hour after an Ewald test meal showed a total acidity of 49, free hydrochloric acid, 39, and a meal of rice and raisins, given at night, revealed retention the following morning. The roentgen ray examination disclosed a considerably enlarged stomach, with greatly exaggerated peristalsis. A large residue was noted in the stomach at the end of six to twenty-four hours; there was a constant deformity at the pylorus and a persistent absence of the duodenal cap. The roentgen ray diagnosis was organic lesion at the outlet of the stomach, producing a high degree of obstruction, the result of an old ulcer. The same conclusion was reached clinically.

Since the patient refused operation, a medical ulcer treatment was instituted at the Mercy Hospital, extending from August 6, 1926, to September 3, 1926. The patient improved steadily, and following his discharge from the Hospital an ambulatory regime was continued. All of the symptoms disappeared and when last examined, on March 23, 1928, he was so well that he could not be prevailed upon to undergo another x-ray examination.

Case 3.—J. B., a man, aged 42 years, consulted us April 21, 1924, on account of a digestive disturbance of several years' duration. The principal symptoms were nausea, "spitting up" of food, acidity, and sore-

Fig. 8, Case 5
No retention five years later.

ness in the stomach several hours after meals, relieved by soda and rest. There was no indication of vomiting of the retention type, but occasionally relief was afforded by forced regurgitation. The physical examination was quite negative except for a definite tender epigastric area. The laboratory findings were normal. A gastric analysis one hour after an Ewald test meal showed a total acidity of 39 and free hydrochloric acid of 30. There was definite retention twelve hours after a meal of rice and raisins. The roentgen ray examination revealed a huge, atonic stomach with slow expulsion, and a defect at the pylorus, with very little elimination at the end of 18 hours, about half of the barium still remaining in the stomach. A diagnosis of pyloric ulcer with partial pyloric obstruction was made.

A modified Sippy regime was instituted at a sanatorium, which extended over a period of five weeks. The patient improved steadily. Another x-ray study was made at this time and the following report was obtained:

"The examination today shows a huge atonic stomach in rather good position, very slow expulsion of contents, with a moderate retention in the stomach at the end of 18 hours. The local condition of the stomach seems somewhat improved over the previous examination."

In March, 1925, ten months later, the patient returned for a re-examination, having been free of all digestive symptoms during this period. The roentgen examination disclosed an improved condition with less retention than at the previous examination. In February of 1928 we again examined this patient. He had been eating everything he desired and had discontinued his alkalis for the preceding two years, without any resultant gastric discomfort. The following is the roentgenologist's report:

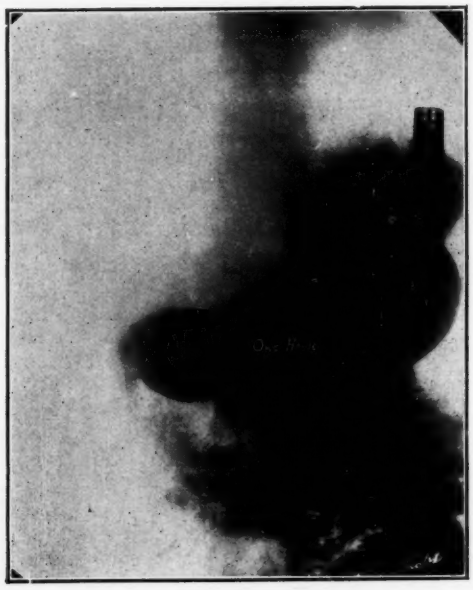

Fig. 9. Case 3
Immediate film of stomach.

"The x-ray examination at this time shows a stomach just a trifle above the upper limits of normal as far as size is concerned. The motility of the stomach is good and there is no obstruction. The examination today would indicate that we are dealing with the end result of an old pyloric ulcer, with no evidence of any obstruction." There was no indication of any retention twelve hours following the ingestion of the motor meal.

Case 4.—J. W., a man, aged 29 years, consulted us on January 20, 1928, complaining of indigestion of five months' duration. At first he had a sense of fullness and distress following meals, some acidity and belching. In September, 1927, without apparent cause, he suddenly became nauseated, dizzy and vomited a considerable quantity of bloody material. The following day several tar-colored stools were discharged. In November another similar attack of hematemesis and melena occurred. Since this time he had had more or less continuous nausea and occasionally had vomited food taken the day previously. Pain was experienced several hours after meals, which was relieved by soda. There had been no loss of weight.

The physical examination revealed nothing abnormal. The gastric analysis showed a total acidity of 63, and free hydrochloric acid of 54. There was definite retention following the motor meal. Otherwise the laboratory findings were normal. The report of the x-ray examination was as follows:

"A slightly enlarged stomach with hyperactive peristalsis and with very little elimination of barium. The pylorus and duodenal cap are irregular and there is a filling defect on the inner and upper border of the cap. At the end of eighteen hours there is a large gastric retention."

The diagnosis arrived at was pyloro-duodenal ulcer, with partial pyloric obstruction. The patient was given a modified Sippy treatment at the Mercy Hospital, which extended over a period of five weeks. He made an uneventful recovery. No further roentgenograms were permitted, but a retention test made at the end of the hospital stay failed to reveal any remnants of a motor meal taken twelve hours previously. At his last visit, on March 28, of this year, the patient was apparently perfectly well, although he was on an unrestricted diet.

Case 5.—W. M. S., a woman, aged 54 years, first consulted us in 1915 on account of indigestion and a pelvic affection (uterine fibroids). In 1917 a hysterectomy was performed. In 1921 the digestive symptoms recurred, but in a more aggravated form. The symptoms complained of were nausea, vomiting, the vomitus at times containing food taken the previous day, acidity, pain relieved by food and soda, and recurring several hours later. There was some loss of weight and strength. The physical examination was negative except for a definite epigastric tender area. The gastric analysis showed a total acidity of 43, free hydrochloric acid of 36, and there was definite retention. The roentgen ray examination revealed a large atonic stomach with a defect at the pylorus. At the end of six hours there was present fully 75 per cent barium residue, and at the end of twenty-four hours 25 per cent. A diagnosis of pyloric ulcer, with partial obstruction, was made, and an ambulatory regime was prescribed.

In February of 1923, the patient returned somewhat

improved. The examination, however, revealed little change from the previous findings. In December, 1923, another examination was made. At this time there was distinct improvement in the x-ray findings, but there was still some delay in the expulsion of the barium.

In June of 1927 the patient returned on account of a severe gastric upset which seemed to have followed an attack of influenza. The x-ray examination again revealed a pyloric ulcer with a 25 per cent residue at the end of eighteen hours. The motor meal confirmed the roentgen ray evidence. A modified Sippy treatment was instituted at the Mercy Hospital, which extended from June 18, 1927, to July 20, 1927. A gradual improvement was noted and when the patient was last seen in January, 1928, she was perfectly well. Further x-ray studies were not permitted, but the retention meal was entirely negative.

Case 6.—G. A. E., a male, age 60 years, consulted us on July 10, 1917, complaining of a digestive disturbance of five years' duration. In 1912, he consulted a gastro-enterologist in Germany who, after a thorough investigation, arrived at a diagnosis of duodenal ulcer and prescribed an ambulatory medical treatment. He was entirely relieved, but recently the symptoms recurred. The patient complained of acidity, constipation, flatulency and discomfort in the stomach two or three hours following meals, which was relieved by vichy and food. The physical examination was negative except for the presence of a tender epigastric area. The laboratory findings were normal. A gastric analysis one hour following an Ewald test meal showed a total acidity of 50, and hydrochloric acid free of 35. A retention test, however, disclosed definite eighteen-hour retention.

Fig. 10, Case 3

Shows a large eighteen-hour retention. Arrows indicate lesion at pyloro-duodenal junction.

An x-ray examination revealed a cow horn stomach, with a persistent defect at the pylorus with obstruction, one-third of the barium being present in the stomach after eighteen hours. A medical ulcer regime was instituted in a sanatorium which extended over a period of six weeks. At the end of this time, in spite of the fact that the patient was greatly relieved of his symptoms, there was very little improvement in the roentgen ray findings.

In January, 1919, the patient returned for a re-examination and reported that he had been almost entirely free of indigestion during the past several months. The findings, however, were still quite similar to those observed in 1917.

When the patient was last seen in July, 1922, however, the examination failed to reveal any evidence of retention following the motor meal. The roentgen ray indicated that the ulcer had healed and there was no barium in the stomach at the end of eighteen hours.

CONCLUSIONS

From these observations it appears evident that while pyloric stenosis is usually due to ulcerations associated with cicatricial contraction or to carcinoma a similar condition can be produced by many other causes.

Prominent among these to which attention has been directed are adhesions (perigastric or pericholecystitic), pressure from without upon the pylorus, hypertrophic contraction of the pylorus, linitis plastica, spastic contraction of the pylorus and muscular stasis insufficiency.

Finally there remains a small but definite group of cases in which pyloric stenosis occurs as a result of the cicatrization from ulceration in which the symptoms of retention may disappear, and in which the motor function of the stomach may be restored to a normal or nearly normal state by means of medical treatment alone.

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DISCUSSION (*Abstract*)

Dr. Seale Harris, Birmingham, Ala.—Pyloric obstruction from extrinsic causes is not infrequent. I recall a number of instances of that type. One was an acute pancreatitis with an abscess of the pancreas in which an important symptom was vomiting, and the x-ray

showed very definite obstruction and deformity of the stomach. Operation revealed an enormous abscess of the pancreas.

In another instance a liver abscess had caused obstruction of the pyloric end of the stomach, the principal symptom being vomiting. In another case, a woman had every symptom of gastric carcinoma. Autopsy revealed a large gumma of the liver that was the cause of the obstruction.

Obstruction may also be due to a polyp of the stomach.

In men of the cancer age, unless one is absolutely sure that the case is not one of carcinoma, the patient should have the benefit of an exploratory operation.

In a large number of cases of pyloric stenosis with ulcer, unquestionably pylorospasm is responsible for gastric retention. We should be slow in having a patient of that type operated upon without the opportunity for medical treatment, even where there are apparent stenosis and marked symptoms of obstruction. If the condition is not improved under medical treatment operation can then be done. I recall a patient with 90 per cent retention in six hours and 75 per cent in twenty-four hours, who refused operation. We outlined a diet for him to carry out at home, and he returned in five or six years showing no obstruction.

In the type with adhesions of the gall bladder, the Graham test, which is, of course, a very great advance, will enable us to make the diagnosis.

We often must distinguish between duodenal ulcer, gastric ulcer, gall bladder infection and chronic appendicitis. One of the symptoms of chronic appendicitis is a pylorospasm, and the patient often suffers more from pain on the left side. I have seen several of those cases with the appendix bound down in a mass of adhesions. The operation relieved the patient of the pylorospasm, and, of course, of the gastric retention.

Dr. Sidney K. Simon, New Orleans, La.—Doctor Friedenwald's paper brings up the age-old question of when to operate and when not to operate upon cases of apparent gastric retention. That question is before every internist at some time or other. Cases of twenty-four-hour gastric retention always require surgical intervention.

The importance of Doctor Friedenwald's paper this morning is, I think, in calling our attention to a small group of cases which have an actual cicatrix at the pylorus and also spacticity of the pyloric musculature which produces a major degree of stenosis. I, among many other medical men, have taken rather a hard and fast position in regard to the operability of cases of pyloric obstruction, believing that surgical treatment was indicated. I never did agree with Doctor Sippy that marked degrees of gastric retention could be relieved by simple medical treatment. Ten-hour retention might be due to an edematous condition of the pylorus, an ulcerated state, or possibly to some degree of hyperspasticity. But beyond that limit I always conceive of a case as one of actual cicatricial stenosis and that, to my mind, is a surgical condition.

There must be a group of cases which have a small cicatrix, possibly from a healed or healing ulcer plus a large degree of spasticity, which can be relieved by simple medical measures.

We have all seen cases with a complete or almost complete obstruction at the lower end of the esophagus due to cardiospasm. Those cases are not operable. We have had to treat them medically. After patient endeavor, very frequently the spasm relaxes, although in the meantime the cardiospasm has been so complete as to present an actual dilatation of the lower end of the esophagus. Had the surgeon access to this field the cases would be operated upon as cases of permanent stenosis, but they are not accessible to surgical intervention, as a rule. With very careful handling, after many months or a year or two, sometimes those cases are relieved. We believe that we are dealing with probably a reflex phenomenon in a hyperspastic individual. It is quite possible that Doctor Friedenwald's cases of pylorospasm are somewhat of that nature. He may find that they are hyperspastic types of individuals who have other forms of hyperspasm of the musculature. We might thus explain these unexplained pyloric obstructions which are not frankly of a cicatricial origin.

Dr. Douglas Vanderhoof, Richmond, Va.—It is a well known surgical experience that the most brilliant results of operation for peptic ulcer are obtained in cases with pyloric obstruction. Those cases of peptic ulcer where the obstructive phenomenon is not present are in contrast. On the other hand, I am inclined to disagree with Doctor Simon in his recommendation of immediate operation in cases with apparent complete pyloric obstruction for the reason that, as Doctor Friedenwald explained this morning, not infrequently most remarkable results are obtained by medical treatment. What happens is this: a patient comes to us with a very suggestive ulcer history, saying that more recently the symptoms have been aggravated by pronounced vomiting. Examination shows at the end of six hours a retention of barium in the stomach amounting to nearly the whole meal. It is impossible to be certain whether we are dealing with a pyloric or duodenal ulcer, or whether carcinoma is present. The patient is placed in the hospital for observation, usually with the impression that he will come to operation. Under the usual medical treatment for peptic ulcer, based on the lines originally laid down by Bertram Sippy, one is surprised at times to find within ten days or less a very marked reduction in the degree of obstruction, finally a complete disappearance of it, and then roentgen ray examination will disclose the nature of the lesion, which is usually duodenal ulcer. These cases, of course, are not seen every day. It is the occasional patient that presents this situation.

Whenever we see a patient with complete pyloric obstruction, probably due to ulcer, we feel that he should have a trial of carefully supervised medical treatment before we resort to surgery.

Dr. J. R. Verbrycke, Jr., Washington, D. C.—I am collecting a series of cases, supposedly surgical in the beginning, which very surprisingly got along without operation. They had not even the advantage of medical treatment. Several cases of pyloric obstruction refused treatment, but returned apparently well. This is unusual, however, and we should not expect it to occur.

I disagree with some of the speakers who claim that pyloric obstruction should be treated medically for a while. During that time the blood chlorids may lower to such a point that when the case does come to operation it will be with a mortality five times greater than if it were operated upon at the beginning. There is no question that pyloric obstruction is a surgical condition, and most of those cases, I believe, which

show an apparent cure, will with time become surgical.

There are two other unusual types of pyloric obstruction: first, the cases of pyloric obstruction which do not vomit. It is surprising what a little bit of obstruction will make some people vomit and what a huge amount others can have without any vomiting.

Another unusual type of pyloric obstruction is one that I presented last year before the Gastro-Enterological Association, pyloric obstruction due to a food bolus, a large curd of milk which was finally vomited with relief of the condition.

Dr. George C. Mizell, Atlanta, Ga.—We note the caution with which Doctor Friedenwald surrounded his remarks in regard to the success of medical treatment of pyloric obstruction. Perhaps a little more emphasis needs to be laid upon the type of pyloric obstruction that he is speaking about. As I understand his paper, he is speaking of a type of pyloric obstruction that does not yield to treatment for spasm, but an organic thing that is still present after the treatment for spasm has been carried out. It is not that type of obstruction that disappears in two weeks' time. It is a type that has been present in more or less degree over a number of years, 10, 15, or 25 years; or in which there have been a number of exacerbations, probably an ulcer, with or without perigastric inflammation.

Perhaps our opportunities for observing the results of medical treatment in this group have been determined by the patient in his refusal to resort to surgery. This is true in my work. I have been very forcibly impressed with what can be done by long-continued medical treatment. Medical treatment must not be judged by the directions that are given the patient. It will not avail unless it is carried out by the patient and carried out for a long period of time.

Doctor Friedenwald's cases are limited to pyloric obstruction. We may add to this group a group of cases of duodenal obstruction. Some patients with marked retention in the stomach due to duodenal obstruction, perhaps cicatricial tissue in the duodenum, or periduodenal adhesions, give surprising results under medical treatment, which was instituted because they were in such a low state of vitality that the surgical risk was too great, or because they had refused operation.

Dr. A. L. Levin, New Orleans, La.—I have observed an instance of pyloric obstruction caused by a factor distant from the pylorus, namely, by intestinal parasites.

Dr. J. C. Bloodgood, Baltimore, Md.—What is the risk of cancer in postponing operation for pyloric stenosis? We have an instrument of precision for recognizing these lesions in the x-ray. If the x-ray and fluoroscopic studies rule out a filling defect on the gastric side, suggesting that the pyloric stenosis, whatever it may be, is not from gastric origin, the chances of overlooking a carcinoma are very, very small. Doctor Friedenwald knows exactly how many cases he has had that he has not operated upon who have developed cancer. I doubt that he has had any.

In my experience with surgery of the duodenum, sometimes the risk of an operation on an individual, whatever that operation may be, is too great. The probability is increased that you will have to do a posterior gastro-enterostomy rather than a Finney, and the posterior gastro-enterostomy is an operation of necessity and not of choice. Many patients are bad operative risks.

Pyloric stenosis that cannot be explained by spasm is relieved by medical treatment over a long period of years. Doctor Mizell made a fundamental statement that now and then we have to thank those people who refuse operation.

Dr. Friedenwald (closing).—There is a small group of cases of pyloric stenosis of a cicatricial type which will yield to medical treatment. I do not advocate that method of treatment in all instances, but there are some patients who are too ill to undergo operation and are not good risks, while others absolutely refuse operation. It is possible in some of these cases to secure very excellent results without operation. However, this numbers but a very small group, and one must be very careful in selecting such cases for medical treatment.

UTEROSALPINGOGRAPHY*

By GUTHRIE YOEHLEE GRAVES, M.D.,
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The gynecologist makes his diagnosis after a careful and painstaking history, a complete physical examination, which includes a bimanual vaginal and rectal examination and a thorough inspection of vulva, vagina and cervix with a speculum. Numerous laboratory tests are employed which must be taken into consideration before a final diagnosis is reached. Yet with all his care and skill, he is often puzzled as to the nature of the gynecological condition which he must treat. Necessarily, he will welcome any new method of precision which will enable him to make a more correct diagnosis.

This method requires some extra skill and time of the physician and a small additional expense for the patient, but these factors should not exclude this diagnostic method which possesses some merit. The idea is not new. It is the pneumoperitoneum combined with the injection of an iodized oil into the uterine cavity and fallopian tubes for the determination of the size, contour and variations in the walls and cavities of the pelvic organs.

Ever since Kelling, in 1902, injected air into the peritoneal cavity, the pneumoperitoneum has been used for diagnostic purposes. Jacobeus, in 1910-1911, revived the method and demonstrated its safety by his experiments upon cadavers. He proved that it was extremely difficult to injure the abdominal viscera by puncture of the abdominal wall and peritoneal cavity with a needle.

In 1912, Weber made a distinct advance over the original idea when he conceived and carried out the method of inflating the peritoneal cavity with air and then making a skiagraph. He stressed the value of this procedure for obtaining good pictures showing the outlines of the abdominal organs as well as the demon-

*Received for publication November 21, 1928.

stration of abdominal tumors and masses. After this time, rapid advances were made due to the discoveries of Lorey, Rautenberg and Goettge. Stein and Stewart introduced pneumoperitoneum into the United States in 1919. Rubin was the first gynecologist to use this test for prognosis as well as for diagnosis. His method of inflation of the fallopian tubes with oxygen to determine their patency and the production of artificial pneumoperitoneum first gave to the profession an accurate and safe procedure for determining the patency of the tubes. It was a great step in determining the cause of sterility in the female. Peterson perfected Rubin's technic and brought the artificial pneumoperitoneum up to its present state of efficiency.

Portiet, in 1923, was probably the first to inject iodized oil into the uterine cavity for roentgen ray study. Ferre reported six cases of uterine fibromyomata which were diagnosed by this method. Heuser used this procedure to diagnose early pregnancy. He emphasized the fact that it rarely caused abortion and was a safe procedure for both mother and fetus. Other men, notably Newell of St. Louis, have used it with success.

Early in 1927, I began to combine the pneumoperitoneum with an injection of iodized oil into the uterine cavity, and I submit as a preliminary report some of my results and conclusions.

This method causes but little more pain and inconvenience than either the pneumoperitoneum or the injection of the uterine cavity alone. This procedure should not be used routinely. It is only indicated in cases in which the diagnosis is obscure. The history, physical examination, and laboratory tests should be carefully considered and correlated with this method to arrive at a correct diagnosis.

There are certain contra-indications which must be kept in mind. A purulent, or bloody discharge from the vagina, an acute salpingitis or metritis are definite contra-indications. The method should not be tried until the infection is cleared up. The peritoneal cavity should not be inflated in the presence of heart lesions or large uterine or abdominal tumors, because the upward pressure of the gas upon the diaphragm might seriously embarrass the circulation and respiration in these instances.

Fig. 1

Large tumors do not make so good pictures as the small growths, for they so fill the pelvis that the gas has no opportunity to outline the mass. Dense pelvic adhesions give poor pictures, because the pelvic viscera are so matted together that the gas cannot outline the individual organs distinctly. Patients with many adhesions complain of more pain during the procedure.

Probably the greatest value of this method is in the diagnosis of intra-uterine conditions such as polyps, fibroids, or any other abnormality which would cause an irregularity of the uterine wall or cavity. In cases with thickened uterine walls it shows the thickening with great distinctness. It is possible to tell whether the uterine cavity or the whole uterus is displaced or enlarged. This procedure is of value in determining the patency of the fallopian tubes and gives definite knowledge as to the point of obstruction; the pneumoperitoneum giving the outline of the whole tube, while the iodized oil outlines the lumen of the patent part. This method should not displace the Rubin test in the diagnosis of sterility in women. It should be used only in those cases which have been proved to have obstruction in the tubes. It accurately localizes the point of obstruction; therefore, it shows the cases which would be fit subjects for salpingostomy. In this way it can eliminate many useless operations.

This procedure sometimes will enable the gynecologist to distinguish between tumors of the ovary and pelvic inflammatory masses. In an appreciable number of patients the pneumoperitoneum alone will show the masses which cannot be diagnosed as tubal or ovarian; if the tubes can be injected by this method, the mass is proven to be definitely ovarian. It will become helpful in differentiating intra-uterine from extra-uterine tumors.

It is of value in the patient who complains

of intense pelvic symptoms, but in whom the examination and roentgenogram reveal a normal uterus, tubes and ovaries. Neurasthenics are greatly benefited by this diagnosis, as useless operations are avoided and a neurologist is able to treat them with greater success.

Two precautions must be observed to make the test a success. The patient must be cooperative and she must be well prepared. Most failures are due to these causes.

Iodipin, a compound of iodized vegetable oils, containing 40 per cent iodin, is used. It is non-caustic and non-toxic and casts a dense shadow upon an x-ray film. It is non-irritating to the tubal mucosa or peritoneum. This is proven by the absence of any symptoms and by the fact that, upon operation, the iodipin is found free in the peritoneal cavity with no evidence of irritation or infection. One case of chronic salpingitis had a mild exacerbation of the disease following this procedure.

Carbon dioxid is used for the inflation of the peritoneal cavity. It is rapidly absorbed and is non-toxic. About 1,800 c. c. of gas are required for a satisfactory pneumoperitoneum. The gas is given through a regulation Rubin's apparatus. The gas is regulated so that 300 c. c. of the carbon dioxid is given off every minute.

All of the x-ray plates are made stereoscopically and upon the Bucky diaphragm. The Bucky diaphragm is placed upon a stand which gives it an angle of about 30 degrees with the x-ray table. The patient is placed face downward upon the slanted Bucky diaphragm. The Coolidge tube is set perpendicularly to the x-ray table and the rays are directed straight down on a point just below the tip of the coccyx. In this manner the x-rays are passed in such a direction that no part of the bony pelvis overshadows the pelvic viscera. Occasionally, I vary this technic by placing the patient with the back upon the slanted Bucky diaphragm, and placing the x-ray tube so that the rays are directed perpendicularly to the Bucky diaphragm. This is used when it is necessary to get a different view of the uterus. It proves to be satisfactory in demonstrating the cavities of the uterus and tubes, but the detail of the walls of the uterus and of the adnexa is so poor that I seldom use this method. I reserve it for those cases where it is necessary to show an antero-posterior view of the uterine cavity.

All plates are taken with a 4½ to a 6-inch spark gap, with 30 milliamperes, 5 seconds time, and with the tube 25 inches from the plate.

The technic for the operation is not difficult. After the patient has been thoroughly prepared she is placed upon the Bucky diaphragm in the Trendelenberg position. The skin of the abdomen is sterilized with 3.5 per cent iodin. The skin and fascia, at a point 1½ inches below the umbilicus, are infiltrated with 0.5 per cent novocain. A small niche is made in the skin. A spinal puncture needle is passed through this niche to the fascia which is easily recognized by the resistance it offers. The needle is then thrust into the peritoneal cavity. It is connected with the Rubin's apparatus. The pressure in the mercury manometer is closely observed. It should stay between 20 and 40. Any marked rise of the mercury indicates that the needle is either not in the peritoneal cavity or that its point is pressing against one of the abdominal viscera. If this occurs the point of the needle is shifted until the column of mercury begins to fall. When the inflation of the peritoneal cavity is finished, the patient is placed in a modified Sim's position. The cervix and vagina are sponged thoroughly with a dry sponge and 5 per cent picric acid solution is applied to cervix and vagina. The cervix is grasped with a tenaculum. A Keys-Ultzmann's cannula is introduced into the cervical canal. The patient is then turned on the stomach, but still kept in the Trendelenberg position. About

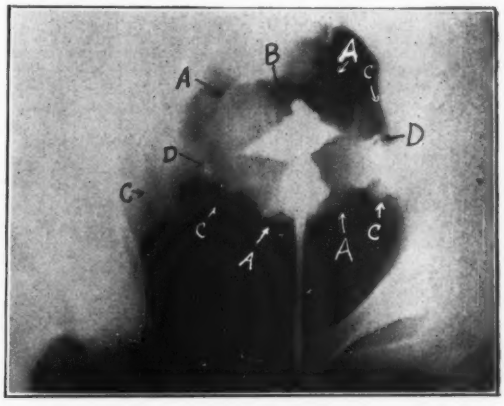

Fig. 2

5 to 8 c. c. of iodipin are introduced into the uterine cavity. The injection is made slowly until the patient complains of colicky pain. A strong pull is exerted upon the cervix by means of the tenaculum; this prevents the sacrum from overshadowing the uterus and its adnexa. The roentgenograms are then made. The patient is kept in this position fifteen minutes longer, when she is allowed to get up.

CONCLUSIONS

(1) This method is of material aid in the diagnosis of obscure gynecological conditions.

(2) It is not a routine measure, but only to be used where ordinary methods do not give a clear diagnosis.

(3) It is of great benefit in differentiating intra-uterine from extra-uterine conditions.

(4) The point of obstruction in tubal stenosis is readily determined.

(5) It is helpful in distinguishing between ovarian tumors and tubal inflammatory masses.

(6) The method gives the outline of the walls and of the cavities of the uterus and tubes upon the same roentgenogram.

(7) It is performed with slightly more difficulty than the Rubin's test.

(8) Pelvic disease can be studied in great detail by this method.

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RUPTURE OF A HEALTHY-LOOKING HYPERTROPHIED HEART BY MUSCULAR STRAIN*†

By HARRY T. MARSHALL, M.D.,
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Rupture of the heart is seen in two forms: traumatic and spontaneous. A majority of the spontaneous ruptures occur through recent necrotic infarcts with softening, a minority where a fibrous patch in the heart wall gradually sags, causing an aneurysmal dilatation which eventually thins out and bursts. A very small number of spontaneous ruptures occur in places where the heart wall presents other lesions, such as abscess, gumma, tubercle, metastatic tumor or parasitic cyst. Rupture through a gumma was seen only once in 10,200 autopsies at Bellevue.[3]

This subject has been discussed fully in recent years by Krumbhaar and Crowell,[1] whose work is in agreement with the conclusions of Nuzum and Hagen[2] and of de la Chapelle.[3]

Spontaneous rupture is rare: 23 times in 47,000 autopsies,[1] or once in 243 cases. Krumbhaar and Crowell collected 632 cases from medical literature and added 22 new ones. About forty-four more have appeared since their publication.‡

According to Krumbhaar and Crowell, the disease has a venerable history, having been described by Harvey, who himself died of heart rupture, and by Morgagni, the father of pathology. The authors find that spontaneous rupture is a disease of elderly life; over 72 per cent of cases occur between the fiftieth and eightieth year; nearly 86 per cent after the age of 50. Males are more often affected than females, in the proportion of 58 to 42. Heart

*Read in Section on Pathology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

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‡Nuzum and Hagen,[2] 5 cases; de la Chapelle,[3] 14 cases; Goodall and Weir,[4] 18; Stott and Blair,[5] Hodge,[6] Petersen,[7] Miller,[8] Eichler,[9] each one case; Thomas and Tattersall,[10] two cases. Thomas and Tattersall and Goodall and Weir each include a case of rupture through a gumma of ventricle; Goodall and Graham rupture of guinea pig's heart during sexual excitement, but with no description of the heart; Eichler, rupture during a trip up a mountain by train. Aside from the gummas and guinea pig all cases showed severe coronary disease and myocardial change. Detailed description of gummas is lacking. The question may well be asked "were not most of these actually infarcts?" All occurred in elderly subjects.

rupture is unexpectedly frequent among the insane; possibly intemperance is a predisposing factor.[1] It is commoner among the laboring than professional classes.[2]

The apparent exciting cause of heart rupture usually is insignificant: slight exertion, straining at stool, emotional excitement, an injury, a change of altitude.[9] In five of the 278 reports studied by Krumbhaar and Crowell the patients fell dead with no warning; 21 died during sleep. In only two of this series did violent exertion precede the attack.

In some cases the rupture is preceded or accompanied by the symptoms of coronary disease, though these are absent in not a few instances. In three-fourths of the cases death occurs at once; 23 per cent survive the rupture for an interval of from ten minutes to two days; less than 2 per cent live for eight days. The presence of leucocytes and young connective tissue in sections from the ruptured hearts indicated to Krumbhaar and Crowell that the process was older than was suggested by the clinical features.

Death from heart rupture may be due to pressure of blood in the pericardium, the tamponade of Cohnheim; to cerebral anemia; to disturbance of the cardiac timing mechanism. Further study is needed as to mechanism of death.

The site of the tear in the heart in "spontaneous rupture" is more apt to be on the anterior surface and in the lower half of the heart, though there is nothing constant about its position, size or shape. In their collection of 618 cases Krumbhaar and Crowell reported the right atrium ruptured 35 times (5.7 per cent); the left atrium 12 times (2 per cent); the right ventricle 63 times (10.2 per cent); the left ventricle 493 times (79.7 per cent), and there were 15 other tears of septum, apex, or undesignated. Krumbhaar and Crowell did not include reports of partial or incomplete ruptures or of ruptured valves.

The underlying cause of the great majority of heart ruptures was, they found, coronary disease. Of the reports which they analyzed 151 contained descriptions of the coronaries; only nine of these cases had coronaries in fair condition, the rest showed coronary thrombosis or severe coronary disease and myocardial impairment. Of their series of 22 cases, in four the coronaries were not described, but in the rest there was coronary sclerosis and myocardial fibrosis combined with thrombosis in 11; with necrosis of myocardium in 14. In many instances the rupture occurred through the necrotic and softened infarct; in others the process was more gradual. With progressing coronary sclerosis myocardial atrophy proceeds with replacement fibrosis; the fibrous patch gradually sags and becomes aneurysmal and eventually ruptures.

It seems to me probable that the softening of the necrotic infarct will be a day or two subsequent to, not coincident with, the thrombus formation and first symptoms. This would also hold for coronary embolism.

Also with the gradual stretching of an aneurysmal fibrous patch the rupture might well occur with no premonitory symptoms. Among these fibrous cases there will be some with adhesions between heart and pericardial sac, which may prevent rupture and which in one case led to rupture through the pericardium into the mediastinum.[2]

In 982 autopsies we have had two spontaneous ruptures of the heart. The first was described by Dr. J. Staige Davis.[11]

A white man of 61 years died four days after the beginning of violent, but irregular, epigastric and precordial pain radiating into the left shoulder and arm with general abdominal sensitiveness. The Wassermann was negative; systolic blood pressure 150, diastolic 95. There were no significant signs except a pulse of 108 with an extra systole every fourth or fifth beat. The pulse rate fell to 96 on the last day and became irregular. While resting quietly in bed the man suddenly became dyspneic and cyanotic and died in two or three minutes.

At the autopsy (373), the heart was moderately and uniformly enlarged and lay in a pericardium distended with fresh fluid blood. The right coronary was sclerotic and narrow and its posterior circumflex ramus was thrombosed. There was a vertical slit in the left ventricle, posterior wall, middle third, close to and parallel with the septum. Inside the ventricles the opening was about an inch long and half an inch wide, but the external opening was small, admitting the handle of a dissecting forceps. The muscle looked and felt healthy, but microscopic sections through the edge of the tear showed coagulation necrosis with numerous polymorphonuclears; the muscles near the epicardium were not necrotic. There was no evidence of gumma, tubercle, tumor or bacterial heart disease, nor of mural thrombus over the lesion. A microscopic thrombus was seen in sections.

There was no important lesion elsewhere; the chief findings being slight or moderate fibrosis of kidney, liver and spleen with evidences of arteriosclerosis. In this case death by tamponade of the pericardium probably followed instantly upon the rupture through a softened infarct. The coronary symptoms began four days before death. It is a fair surmise that the infarction was four days old before it became soft enough to rupture while the patient was resting in bed.

Coronary disease with resulting myocardial defect accounts for nearly all the cases of "spon-

taneous heart rupture" in elderly people. In rupture below the age of 50 coronary sclerosis is rare, but there may be myocardial disease due to coronary embolism, abscess, or one of the other rarer lesions listed above. Below the age of 50 there are more ruptures of the atria; the average age in rupture of the atria being about 45.[1]

One dictum receives general agreement: "spontaneous rupture never occurs in a healthy heart." Suggested by Morgagni, this was stated by Quain in 1850 and re-emphasized by recent writers. However, Krumbhaar includes 44 ruptures with no assignable cause, four in apparently normal hearts.

Our second case occurred in the atrium of an apparently healthy though hypertrophied heart. A white man of 48 years, of quite unusual muscular strength, and apparently in perfect health, undertook alone to crank a large Diesel engine, a task regularly requiring the utmost efforts of two persons. He strained violently over this work for an hour, then stopped, sat down, said he felt badly, as if something had gone wrong with his stomach. Though it was mid-winter, he complained of feeling hotter than ever before in his life. He soon collapsed and in an hour was dead. The attending physician, seeing him dying, found no cause, but suspected a ruptured blood vessel. He was embalmed, buried, and about four months later was disinterred and brought to our autopsy room for determination of the cause of death (Autopsy No. 779).

The body was in excellent condition except for a slight shriveling of the toes and fingers and a slight growth of mould in one or two spots. Embalming fluid had been injected through the right axillary artery and directly into the peritoneal cavity. The embalmer was seen later and confirmed the autopsy observation that no injection had been made into the chest nor up through the diaphragm from the abdomen. It was also established that the embalmer, while injecting the vessels, had used only moderate pressure, with a hand syringe not larger than a bicycle pump.

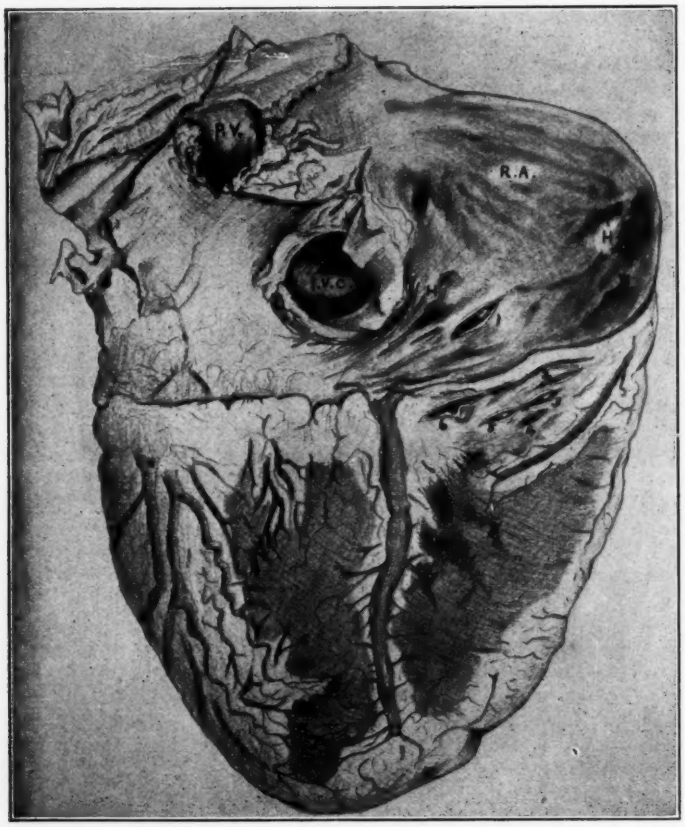

Fig. 1
Posterior aspect of heart. 1-6, slit-like tears through right atrium; H, hemorrhages under epicardium; I. V. C., inferior vena cava; P. V., pulmonary vein; R. A., right atrium.

Except for heart changes, the abnormal findings were unimportant or attributable to embalming. He was a very muscular man. Fifty to 100 c. c. of chocolate-colored fluid were found in the peritoneal cavity and the same material in the pleural cavity, probably post-mortem seepage of blood and embalming fluid. There was a dilatation of the rectum just above the anus, about 8 x 4 cm., but no rupture of the tissues; there were a few erosions of the surface of gastric mucosa; and a few old pleural tags. Everywhere the tissue was well preserved; even the brain and its vessels were well preserved, firm and normal looking.

The pericardium measured 13 cm. laterally, the apex 10 cm. from the midline. The pericardial cavity contained 20-30 c. c. of chocolate-colored fluid mixed with clumps of gelatinous or gummy blackened blood, especially between the right atrium and root of the aorta and over the distended right atrium. The right atrium and ventricle were distended, the left ventricle hypertrophied, but not filled with blood. The heart measured 16.5 cm. from he apex to the root of the atria and 11.5 cm. transversely at the auriculo-ventricular groove. Its weight

was 420 gms. and it contained 10 ounces of blood. The only serious changes were in the wall of the right atrium (see *Figs. 1* and *2*). Four small slits from 2/3 to 1 cm. long in this location led from the cavity of the right atrium. The epicardium, muscle and endocardium looked healthy. Both endocardium and epicardium were pale, smooth and glistening. Several small cribriform openings were also found on the opposite wall of the right atrium, adjacent to the junction with the superior vena cava, involving the anterior end of the atrial septum and the adjacent wall of the atrium. Some of these openings communicated with the space behind the root of the aorta in which were clots of blood. Others represent incomplete ruptures.

We have here a series of cribriform ruptures on the posterior-inferior wall of the right atrium and other cribriform ruptures over its antero-mesial and septal aspects. In addition the atrium was filled with blood and the roof and walls were thinned out from distension. The tissue where the ruptures occurred looked and felt healthy. The openings in the endocardium looked as if they had been nicked with a knife. Most of the epicardial tears were also clean-cut slits. The coronaries were not tortuous, and in the atrio-ventricular groove were embedded in adipose tissue. The left coronary on dissection seemed normal. The right was normal for about half an inch; its external diameter then increased to nearly double and its wall was calcified. This condition was present for an inch to an inch and a half around the margo acutus; thereafter the caliber and texture of the ramus and its subdivisions appeared normal. The altered portion presented a thick wall and a pinhole lumen. Just proximal to this process the coronary was slightly saccular and contained what appeared to be a thrombus, though possibly a post-mortem clot, altered by the embalming and storage. Microscopic sections of the thickened artery stained quite well with hematoxylin, poorly with phloxin and only slightly to fairly with orcein. The external elastica and a thin layer of muscle enclosed atheromatous debris in which were the contours of many needle-like crystals. Occasionally a needle-like crystal was surrounded by a layer of large "foreign body" mononuclear cells. At the line of contact between the external artery wall and the atheroma was a zone of calcification. Apparently spots of the media wall became necrotic and lime salts were deposited around the margins of the foci. Some foci were confluent. There were three or four small collections of lymphocytes in the adventitia and a few lymphocytes in the edge of the necrotic zones of the media. A few capillaries showed distinctly with no perivascular lymphocytes, no obliterative change. Both elastica and muscle extended up to a focus of necrosis to end at a thin line of calcification and necrosis.

The atheroma ended centrally at a greatly thickened intima, consisting of short, thin, irregular threads of elastic tissue in a pale, finely fibrillated background. Toward the lumen there were very few flattened long nuclei; the exterior of the thickened intima bounded the atheromatous layer, except in one sector where a collection of cells and fibrils connected the intima directly with the thin outside wall of the artery. The cells were apparently of fibroblastic types. There were no new capillaries. The internal elastic lamella was not present, but the thick intima was largely composed of short threads of elastic tissue very thin and irregular.

The changes in the coronary wall were, apparently, multiple minute foci of necrosis of the media with calcification and atheroma, and arteriosclerotic thickening of the intima with splitting of the elastica. The necrosis and calcification of the media in separate foci makes this arterial change unlike ordinary arteriosclerosis and its limitation to a short part of the right circumflex ramus is very striking. Its nature is obscure; it is probably not syphilitic.

There can be no doubt that this lesion materially reduced the blood supply of the posterior wall of the right atrium and ventricle, and as the artery disease is a chronic affair the relative anemia of the posterior portion of the right heart must have been of quite long duration. And yet the man was capable of great exertion up to the time of his death. Moreover, there was no evidence of necrosis nor of disease in the epicardium, myocardium nor endocardium where the tears were made in the posterior atrio-ventricular wall. The sections of this region

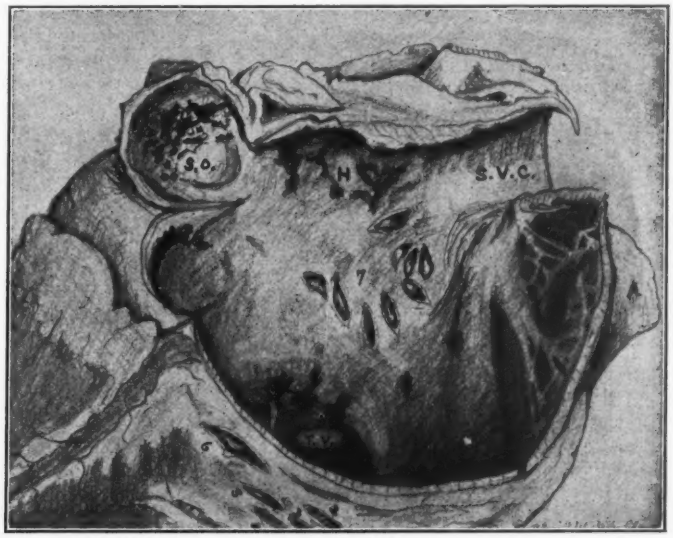

Fig. 2

Interior of right atrium, viewing septum and anterior wall. S. O., septum ovale; S. V. C., superior vena cava; T. V., tricuspid valve; A, tip of right atrial appendix; 7, slits in right atrial septum and in its anterior wall. Several of these are incomplete ruptures.

stained quite well in hematoxylin. The tissue was of even conformation directly up to the edge of a tear, with nuclei of normal, even size and shape and an even density. There were only one or two double nuclei and one or two moderately enlarged vesicular nuclei.

While the condition of the right coronary might lead us to expect an infarction at the site of the rupture, there is no evidence of even slight regressive change in the edge of the tear.

The cribriform ruptures in the antero-mesial aspect of the septum are not easier to understand. According to Gross,[12] this region of the right atrium is usually supplied by the *ramus ostii cava superioris,* which arises from the right coronary close to its origin from the aorta, a region normal in this in heart. Sometimes the ramus arises from the left coronary. I was not able to find this vessel on dissecting the ruptured heart. The atrial septum, according to Gross, is also supplied by the *ramus septi fibrosi,* usually a branch of the right coronary, arising posteriorly, entering the atrial septum, running anteriorly and eventually accompanying the bundle of His. This vessel receives anastomoses from the superior septal branches of the left coronary. It can only be demonstrated in an injected specimen and was not seen in my case. It is difficult in any event to correlate the rupture in the anterior wall of the atrium with a defective blood supply coming through the septal ramus, and with the apparent healthy condition of the ruptured tissue. In this connection, reference may be made to Gross' case of a heart apparently normal in function and at autopsy, which, on injection, proved to have almost complete arteriosclerotic obstruction to the right coronary and no sign of infarction.* Gross attributes the healthiness of the myocardium in his case to the abundant anastomoses. He cites a similar case published by Galli. Gross shows by his injections that there is, decade by decade, a progressive reduction in the blood to the right side of the heart.

The victim of this rupture felt in good health to the time of his death. His extreme physical effort was the direct inciting cause of his heart rupture. The tears in his heart, by their number, their wide distribution and their slit-like appearance in healthy tissue differ from many accounts of "spontaneous" rupture and suggest that pressure of fluid within the atrium was a factor in the rupture, as in one of the varieties of "traumatic" rupture, "Platzruptur"[13] [14] or "bursting."

It seems to me that the sequence of events was this: The protracted intense exertion for one hour exhausted the muscle units dependent for nutrition on the blood supplied through the narrowed right coronary; at the moments of extreme muscular contraction the right atrium was overfilled with venous blood; then, in making a supreme effort, the abdominal and thoracic muscles were intensely contracted, the breath was held and the body suddenly bent in an effort to start the engine. This had the effect of raising intrathoracic pressure, which extended to compress the overfilled right atrium, possibly at the instant of its greatest relaxation in presystole, and under these conditions those regions of atrial muscle most affected by the coronary insufficiency and least supported gave way to the hydraulic pressure exerted by the blood in the atrial cavity.

Just how the ruptures caused the death is obscure, possibly by filling the pericardium or possibly through injury to the conducting system by the ruptures on the anterior wall adjacent to the insertion of the superior vena cava.

*Gross, p. 138.

SUMMARY

(1) One case of typical spontaneous rupture is presented.

(2) An unusual example of multiple cribriform atrial ruptures is discussed. The coronary circulation was defective, but the muscle tissue looked healthy, though hypertrophied. Muscular strain was probably an important factor in the rupture. The ruptures resemble the "bursting" or hydraulic pressure type of traumatic rupture.

(3) The narrowed condition of a section of the right coronary allies this case with "spontaneous rupture," but the anatomical and other data strongly suggest that this is in part a "traumatic rupture" of the bursting type.

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DISCUSSION (*Abstract*)

Dr. C. Sidney Burwell, Nashville, Tenn.—I wish to discuss whether this man's heart actually did rupture at the moment of his supreme exertion or whether it could have happened post-mortem. I think Doctor Marshall's reasoning in that matter is correct. It is difficult to see how the embalming fluid could have been placed in there under such pressure as to rupture the auricle.

I am obliged to differ a little with the idea of the mechanism of the rupture described by Doctor Marshall. It seems to me it must have been pressure from within the auricle rather than compression from intrathoracic pressure, as he suggested. Such pressure within the auricle might come from vigorous contraction of the ventricle with insufficiency of the tricuspid valve. However, a better explanation of what occurred in this instance is that a distending venous pressure was responsible for the rupture. The only mechanism I can imagine for the generation of such a tremendous pressure is the contraction of the abdominal muscles upon a venous bed already full. If there were a full venous system and a full auricle, and suddenly there was a contraction of the abdominal wall and diaphragm, so the normal safety valve, the liver, could not function, then I think there may have been a pressure sufficient to rupture muscle which was, as Doctor Marshall pointed out, the seat of disease. If this was the mechanism, then one wonders what the ordinary mechanisms are that keep this from happening more often. There are, of course, two things that protect against this accident. One is the pericardium, which prevents extreme dilatation, and the other the ability of the auricle to dilate. Perhaps in this case the auricle did not have time to dilate.

The next point is the mechanism of death. The ordinary mechanism of death in rupture of the heart is what we call tamponade, which prevents filling of the heart. The rate of accumulation of the fluid in the pericardium determines the amount which can be endured. It is possible to see two or three thousand c. c. of fluid in the pericardium if it accumulates slowly; on the other hand, two or three hundred c. c. of fluid, if it accumulates very rapidly, may cause death. Doctor Marshall found thirty c. c. of fluid. There are two explanations of that small amount of fluid. One is that the body had been buried for four months and had dried out somewhat; another is exudation into the pleural cavity. I do not think, however, it is necessary to assume that tamponade was the cause of death. The tears were not far from the bundle of His, and the conduction bundle was interfered with to that extent.

Dr. Charles Phillips, Richmond, Va.—In our museum there is a case of a ruptured heart of a person crushed between two automobiles. The left ventricle was apparently full of blood, for it ruptured in a clean, long split, the man falling dead as soon as he was released from between the two cars. The coroner found the pericardium distended with blood.

Another case was that of a retired business man who one day in his garden was carrying a box of dirt and, nearly dropping it, he made vigorous efforts to recover. Immediately he was seized with chest pain and collapsed with some unknown cardiac condition. The next day another seizure carried him off. Inasmuch as there was considerable accident insurance involved, an autopsy was done some time after burial, the body having been well embalmed. Examination of the heart showed a left ventricle with rupture which had apparently taken place in two stages, the endocardium and some muscle first, and probably at the accident in the garden, followed later by complete rupture of the last fibers and epicardium and escape of blood into the pericardium. Microscopic examination showed an apparent interstitial myocarditis. I do not recall how the case was settled, but we felt that the heart was probably diseased, since it ruptured in this way.

I have felt that a healthy heart will not rupture.

Dr. Marshall (closing).—Doctor Burwell reviewed the factors concerned in maintaining the flow towards the auricle and in emptying the big veins. This offers an explanation of what is called the hydraulic-pressure rupture, because the thing that saves the auricle from hydraulic pressure rupture in some emergencies is the rapid return of blood back into the veins. The hydraulic-pressure rupture may be understood by an illustration. Suppose you fill a toy balloon with water and with your fingers separated squeeze it. It will rupture between your fingers; the force will be in your fingers toward the center, but the expansive force will be from the center toward your fingers, and rupture will occur from pressure within. I think that was the case in this heart rupture. I doubt very much that the inpouring of blood alone would have resulted in rupture, though the flow was increased by an hour's hard work. It is more likely that there was an increased flow; that the atrial muscle was partly anemic owing to the narrowed right coronary; that the one hour's strain fatigued the anemic atrial muscle; and with the stage set there came ruptures through those parts of atrium with least support at a moment of diastole coinciding with a sudden muscular effort, causing thoracic compression.

Here we have multiple ruptures on the anterior wall of the atrium and, separated from them, ruptures on the posterior wall. How can we correlate that with the location of the arterial narrowing? The posterior ruptures are in the region supplied by twigs arising from the narrow artery. Louis Gross shows that ordinarily the right coronary, as it reaches the posterior region of the heart below the inferior cava, sends a branch forward in the substance of the atrial septum which anastomoses with a branch of the left coronary and with a twig given off at the origin of the right coronary. Comparing my specimen with Gross' account, I cannot convince myself that there was any vascular deficiency of the ruptured anterior wall region of the right atrium. As the sections show rather healthy muscle, and as other sources of blood supply were contributing to the anterior atrial wall nutrition, the difficulty is to reach a sound conclusion as to how much of the rupture was due to the narrowed region of the right coronary and how much to hydraulic pressure rupture.

Dr. Burwell.—Doctor Marshall spoke of pressure on a rubber balloon leading to rupture. It is true that if you apply pressure on a balloon with the fingers the balloon may be ruptured by force from without, but if you put the balloon in a bell jar and apply uniform pressure, such as was exerted on this heart by intrathoracic pressure, then the balloon would not rupture.

Dr. Marshall.—A heart suddenly overdistended, filling the pericardial sac, would not be equally supported by the pericardium at every point. For example, unsupported regions might occur where the front wall of the right atrium extends to the right and left around the root of the aorta.

CLINICAL RECOGNITION OF THE ARRHYTHMIAS*

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The term arrhythmia is here taken in the broad sense to include all commoner variations from the normal mechanism of the heart beat, whether those abnormalities produce irregularity or not. The variations may be classified into two groups, depending upon conditions that present themselves to the examining physician. These groups are the regular pulse, and the irregular pulse. The material will in accordance be divided into two parts.

By regular pulse I mean one whose rhythm is regular, not necessarily the force. This allows alternation of the pulse to be considered under this general heading.

The first type of the regular pulse that varies from the normal is the slow pulse. When the physician discovers a bradycardia, three possible mechanisms should come to his mind.

Simple bradycardia exhibits no peculiarity except its slowness. All tests whether made by physical examination of the heart or by graphic methods are normal. This is the type of pulse that is found in jaundice, or convalescence from fevers, in certain athletes or persons of large frame.

In sino-auricular block, which is not at all common, the findings are the same except for the fact that upon exercise the pulse may not increase gradually as in simple bradycardia, but suddenly doubles its rate, later to fall back suddenly to the original low rate upon cessation of the effort.

The high grades of the auriculo-ventricular heart block exhibit a regular pulse. In partial block the auricle may beat twice to every beat of the ventricle. This results in ventricular action and pulse rate that is regular and slow, half the usual rate. The pulse is in the great majority of instances in the low forties, though it may be higher or lower. Upon exercise or the use of amyl nitrite or atropin abrupt changes may occur. The rate may double as in sino-auricular block; or if the rate is normal to begin with, it may be suddenly cut in two.

On the other hand, the exercise may change the degree of block, and instead of being 2:1, it may be 3:2, or 4:3, or mixtures of all of these varying sequences. The heart will then present an irregularity, with dropped beats, whose characteristics will be discussed later. At times a faint sound may be heard during diastole, which represents the auricular systole that is not followed by ventricular systole.

Complete A-V block is marked by a pulse that tends to be slower than in partial block, in the thirties. But the ranges overlap, and the rate alone is not sure ground to stand upon in the differentiation. Here, however, those factors that usually increase heart rate, namely exercise, atropin and amyl nitrite, have absolutely no effect upon the rate. The ventricle is entirely isolated functionally from the rest of the body. Other phenomena that may be noted are that the heart sounds vary in their intensity and that occasionally a faint additional sound may be heard between the usual sounds. These phenomena are explained by the fact that auricles and ventricles beat independently, each at their own rate. Unless these rates are definite multiples, their relationship will vary. If the auricle beats alone during a period of ventricular quiet, the adventitious sound between the regular beats is heard. If on the other hand the auricle contracts simultaneously with the ventricles or at the time of closure of the semilunars, there is accentuation of the first or second sound.

The second type of regular pulse that varies from the normal is the rapid pulse or tachycardia. It is true of course that rapid irregular pulses likewise are classified as tachycardias, but for the present, we consider only those of regular rhythm. There are three of these: simple tachycardia, paroxysmal tachycardia and the tachycardia of flutter.

Simple tachycardia is the type of rapid beat, for instance, that is found after exercise. It is a simple physiological response on the part of the heart to increased demands, or to various stimulants. Atropin may cause it by releasing

*Read in Section on Medicine, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

the pacemaker from the usual vagal control. Amyl nitrite, fever, and various toxemias, especially the toxemia of exophthalmic goiter may cause it. The pulse gradually goes up with the exhibition of the causative factor, and gradually comes down with its removal. The vast majority of patients who have rapid heart beat may be said to have simple tachycardia.

In paroxysmal tachycardia, the rate is usually much faster than in the simple type. It varies from 150 to over 200, and is most frequently from 180 to 200. Any simple tachycardia with rate approaching this would have the case so obviously marked that the differentiation would be easy on this score alone. In the paroxysmal type, the rate is constant and does not vary with exertion and drugs, as it will in a heart with normal mechanism under vagus control. Furthermore, paroxysmal tachycardia occurs in definite attacks, and these attacks may be of variable duration. Ordinarily they last from a few minutes to several hours, but they may last days. The onset of the attack is almost always abrupt, and the patient recognizes that there has been a sudden change in the heart action, with rapid beat. The offset of the attack is sometimes abrupt, the patient experiencing a sudden relief, with subsidence of the sensations in the chest. Often, however, the offset is quiet and the patient is not always aware when the change back to normal has occurred. He simply knows that he is better.

Auricular flutter is another mechanism that produces a rapid regular pulse and heart. In this condition the auricles contract at a rate between 250 and 350, usually in the neighborhood of 300. This is entirely too rapid for the heavy ventricles, and they are compelled to follow at a fractional rate, 1/2, 1/3, 1/4, so forth, of the auricular rate. There seems to be a state of block between the auricles and ventricles, at least those measures known to produce A-V block may increase slowing in flutter. The heart, that is, the ventricles, beat at a rate between 100 and 170, and may beat more slowly if digitalis in full doses is used. Thus a tachycardia of high degree which is slowed by digitalis to a rate which has a common multiple with the faster rate, may be diagnosed as flutter. For example, if the auricular rate is 300, the ventricular rate (and pulse rate) may be 150, 100, 75, depending on the degree of block. If the pulse has a slower rate, it may jump to a higher figure on exercise.

Since the rhythm is initiated in parts of the heart not subject to vagus influences, the use of atropin will not change the fundamental auricular rate. It might, however, release the block somewhat, and allow the ventricle to beat at a higher rate.

As long as the ventricle beats at a fixed fraction of the auricular rate, the rhythm remains regular. At times, however, the degree of block changes, resulting in an irregular heart.

If digitalis is pushed to its full therapeutic or even minor toxic effect, not infrequently the rhythm will change to the gross irregularity of fibrillation. Upon withdrawal of the digitalis, the rhythm frequently will become normal, though occasionally it will revert to flutter.

On the whole, the rate in flutter is constant, and is not affected by those simple factors of exertion, excitement, or change of position which easily affect the normal heart.

The final category of disturbances of the pulse that remain regular, is the so-called alternation of the pulse. This pulse phenomenon seems not to be associated with changes elsewhere. The finger on the radial artery may possibly and sometimes does detect a pulse that in its beats is alternatingly strong and weak. But the condition is most easily detected while the blood pressure is being estimated. When the air pressure is released from the cuff, the systolic level is reached; the rate however is only half that previously determined at the wrist. Upon releasing the pressure 5, 10, 15 mm. of mercury more, the rate suddenly doubles, and reaches the full pulse rate. This is the criterion for diagnosing pulsus alternans, and the severity of the condition is marked by the degree of difference in pressure between the higher and lower reading.

When the irregularities of the pulse are approached, it will be found that they fall into four general groups: phasic changes, premature beats with otherwise normal rhythm, dropped beats, and gross irregularities.

Phasic changes are those which occur in the pulse with a regularity that suggests the ebb and flow of the tide. The pulse phases are short, however, lasting over 2-5 beats. There is an increasing of rate followed by a slowing and a subsequent increase again. This type of irregularity is found most frequently in the young and tends to disappear with the advance of the years. If it is observed closely, it will be seen to follow the phases of respiration, quickening with inspiration, slowing with expiration. Deep breathing accentuates the arrhythmia. The rate is generally under 100, and those factors that increase the rate usually abolish it. In young children the irregularity is often so

marked as to be of concern to the family and physician, but it is of no pathological importance. This type of irregularity is called sinus arrhythmia and is due to phasic vagal stimulation. Occasionally it is found not associated with respiration, and rarely it is produced in digitalis poisoning.

There is a type of irregularity that is marked by a single premature beat, followed after the normal interval by the regular pulse. This premature beat without a compensatory pause after it is due to a premature systole of the auricle. There is no other physical sign associated.

Dropped beats are the most common of all the irregularities. By dropping of a beat there is meant an absence of an expected beat at the wrist. The two causes of beats being dropped from an otherwise regular pulse are ventricular premature beats and the lower grades of heart block. The premature beats are by far more common. Upon careful palpation of the radial pulse it may be found that at times the dropped beat is entirely gone, while at other times it may be felt as a faint premature beat followed by a compensatory pause. This depends entirely upon whether or not the premature beat is strong enough to produce a pulse wave. The next beat falls at the time it normally should if there had been no interruption. Upon listening over the heart, premature heart sounds are heard. If the premature beat is very early, it may be so feeble that the semilunar valves are not opened. They, therefore, may not close again, and there will be no second sound for this contraction. Thus the premature beat may be manifested by a first and second sound, or by a first sound alone. In the latter case, of course, there will be no pulse in the arteries. If this occurs, or if the premature is too weak to send a palpable pulse wave to the radial artery, there will be a difference in the number of contractions as determined by auscultation of the heart, and the number of contractions as determined at the wrist, a pulse deficit.

Upon estimating the blood pressure, there will be two definite levels, the higher corresponding to the beats that follow the pauses, the lower, the true systolic of the normal beats. This results from the exceptionally good ventricular filling during the compensatory pause.

Increase of heart rate in the great majority of cases abolishes the irregularity. In some cases, particularly of chronic myocarditis, it may be exercise or increased rate that brings the premature beat into evidence.

The other cause of dropped beats is much less common, the lower grades of heart block. Here there is an occasional or a regularly recurring period of inactivity of the pulse, just as in the premature beat. But, unlike the premature, there is never found during the pause any suggestion of a weak heart beat, and upon listening over the heart there is entire silence during the pause. The pulse follows the heart precisely and there is no pulse deficit.

Factors that change the pulse rate may alter the degree of block and change the rhythm. The dropped beat may disappear, or the block may become of high grade, 2:1, and the pulse become slow and regular.

The blood pressure of the beats following the pause may be elevated above the general level, but are less apt to be, as the pause is not so long as the compensatory pause.

Gross irregularities of the heart beat and pulse are almost always caused by auricular fibrillation. Here the irregularity is absolute and constant. There are no rhythmic dropping of beats, no occasional pauses, no runs of truly regular beats, although at times this latter seems likely. On the contrary, the intervals between the pulse beats and heart sounds are constantly changing. Just when there seems to be a short series of regular beats, there is an interruption by a burst of fast beats or an unusually long pause. The force of the pulse wave is similarly variable. If this type of irregularity is present and the pulse is 120 or over, fibrillation is almost sure to be present. But fibrillation may be slow, too, and requires even more careful observation then.

The heart sounds are usually in the normal pairs, first and second, but at times a beat is too weak to open the semilunar valves and then only a first sound is heard. At other times, though both sounds are produced, the impulse may be too weak to be propagated to the wrist. Under these circumstances there will be a pulse deficit. The pulse rate as determined with the stethoscope will be higher than the rate determined by palpation of the radial artery.

When the blood pressure is estimated it is found that the systolic reading is difficult to obtain. It will not be found at the single of the normal heart, nor the double level of premature beats and heart block. Instead the beats come through quite irregularly at different levels. The diastolic may be equally uncertain. This is one of the most satisfactory of the clinical tests for fibrillation.

On exercise or after atropin or nitrites the irregularity is apt to become more marked.

The response to digitalis is one of the satisfactory subsidiary signs, especially if the pulse is rapid. No other condition responds so promptly by drop of pulse rate, decrease in deficit and improvement in general state as fibrillation, even though the pulse remains absolutely irregular.

Rarely, ventricular premature beats, when they are exceptionally frequent and irregularly placed, may be confused with fibrillation. But the facts that the premature beats are rarely found at rapid rates, that exercise may cause their disappearance, and that the blood pressure is steadier at two systolic levels, will help to differentiate. Observation over a period of days under treatment will generally allow a definite diagnosis to be made.

Still more rarely, flutter with variable degrees of block may be confused. Exercise, or digitalization may steady the pulse in flutter so that it will become regular. Neither will steady the pulse in fibrillation.

SUMMARY

Study of the pulse and heart demonstrates various abnormalities or rate and rhythm. When the rhythm is regular, the pulse may be slow, as in bradycardia, rapid as in tachycardia, or of unequal strength as in pulsus alternans. Bradycardias are classified as simple bradycardia, sino-auricular block, or auriculo-ventricular block. Tachycardias are classified as simple tachycardia, paroxysmal tachycardia, and auricular flutter.

When the rhythm is irregular, it may be classified as phasic irregularity, the premature beat without pause, the dropped beat, or gross irregularity. The first of these is caused by sinus arrhythmia, the second by auricular premature beats. Dropped beats may be caused by ventricular premature beats and low grade partial block. The gross irregularity is almost always caused by auricular fibrillation.

Each of these conditions is discussed from the point of view of the physician unable to avail himself of the diagnostic capacity of the electrocardiograph, with which all arrhythmias are clear. The ordinary clinical findings and the response of the heart to exercise and various drugs are used as the criteria for differentiation.

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DISCUSSION (*Abstract*)

Dr. J. E. Paullin, Atlanta, Ga.—The paper of Doctor Stern has brought to our attention certain facts which will materially help in the bedside differentiation of various cardiac arrhythmias. Properly to appreciate the value of these observations it is essential that one have definite information as to the causation, in so far as is known, the mechanism and sequence of events in a given type of arrhythmia. This presupposes a knowledge of the physiology of the heart, its conducting system, as well as its abnormal action in response to disease of stimuli which affect either directly or indirectly the conducting system of musculature.

To summarize briefly the facilities at hand which are helpful in the clinical differentiation of the various types of arrhythmias mentioned by Doctor Stern, I would like to add also the value to be obtained by careful and painstaking observation of the venous pulse combined with palpation of the radial artery and auscultation of the heart. All of these can be done in suitable patients at the same time. In a considerable number of patients the venous pulse, provided a suitable light is at hand, can be easily seen in the external jugular vein or in the jugular bulb. During the normal respiratory cycle this vein is observed to distend and collapse or to remain partially filled. The venous pulse, as observed, is a reflection of what actually occurs during a cardiac cycle. If the heart rate is not too rapid, by this combined method of palpating the radial artery and listening to the heart, one is able to identify at least two of the three waves which occur with each cardiac cycle. It is of great value in helping to distinguish many of the arrhythmias and is the best clinical aid at our command in determining the presence or absence of auricular systoles. It is useful in helping to differentiate the arrhythmias due to: (a) simple bradycardia, (b) varying degrees of heart block, (c) sinus arrhythmia, (d) premature beats, (e) ventricular extrasystoles, (f) auricular fibrillation.

The value of exercise as mentioned and stressed by Doctor Stern is perhaps the next most important agent in helping with this differentiation. After a sufficient amount of exercise to speed up the heart rate certain types of irregularity disappear, not always, but usually. Some are accentuated. This is true of: (a) sinus arrhythmia, (b) certain types of heart block, (c) auricular and ventricular extrasystoles, (d) premature beats, et cetera. So that in many types of irregularities one should not definitely decide on the nature of the disturbance until the heart's action is studied both before and after moderate exercise.

The sphygmomanometer is a reliable means of detecting alternation of the pulse. It is also of value in studying the types of irregularities due to premature beats and extrasystoles.

Combined palpation of the radial artery and simultaneous auscultation of the heart sounds have already been stressed.

Certain drugs have already been mentioned and I would but briefly summarize these: atropin, by relieving the inhibitory action of the vagus nerve, will help in differentiating some of the irregularities when the heart is slow or with a normal rate; at times it produces abrupt changes in rate. Amyl nitrite and digitalis are very useful aids in diagnosis.

Our knowledge of these irregularities is due to the careful studies which have been made by many workers,

using the polygraph and the electrocardiograph. While many of the irregularities can be clinically recognized, there still remains a group seen occasionally where the employment of additional aid is essential in helping to complete a correct diagnosis.

Dr. Stern (closing).—It is manifestly impossible to explain the irregularities of the heart, as Dr. Paullin has suggested, without a thorough knowledge of the physiological workings of this complicated organ. The venous pulse is one of the things that has led to a better knowledge of this subject. It was the study of the venous pulse by Mackenzie that gave us the first real knowledge of these irregularities. I did not include that, because it is an extremely difficult thing to observe, unless one has had careful grounding in the use of the polygraph and the significance of the various waves. You see waves that have no definite significance to you unless you are very familiar with the mechanism of the heart and with the events that are going on at the time. Consequently, from a practical point of view, for the average man, I feel that study of the venous pulse is not a helpful method and its inclusion in this paper might have led to more confusion. I am glad that it was brought out in the discussion, because it is a valuable point. The diagnosis is sometimes made clear from the observation of the venous pulse when otherwise it would not be.

With a thorough knowledge of the physiological and pathologic changes of the heart, one often cannot make a definite diagnosis of the type of irregularity without study by some of the graphic methods. There is only one way in which we can absolutely answer certain questions. That is by the electrocardiogram, and sometimes it fails. Occasionally the polygraph will make the diagnosis where it is difficult to do so by other means. Occasionally I find a patient with flutter and with an irregular type of pulse which is difficult to diagnose. The electrocardiograph, however, will be very much more effective in the differentiation, and when there is any doubt as to the type of the arrhythmia certainly this so-called "court of last appeal" should be used.

GALL BLADDER OPERATIVE MORTALITY*†

By J. Russell Verbrycke, Jr., M.D.,
Washington, D. C.

When the prospective patient asks, "Is it a serious operation?" the physician is apt to reply that every operation has some risk and that such risk is governed by the condition of the patient and the ability of the operator. It should be the duty of the surgeon to aim constantly to improve two factors, namely: to see that the patient is in the best possible condition for operation; and secondly, to increase his own ability both in matters of judgment and technic. When fatalities occur they should not be accepted as inevitable, but a painstaking analysis should be made of all the features of the case in order to determine, by retrospect, whether anything different in the conduct of the case might have resulted in a happier termination.

In compiling the statistics of Garfield Memorial Hospital for the 1927 medical report, my reward lay in some observations on the number and possible causes of deaths, and I was particularly interested in the biliary tract operations.

If the risk of operation for a chronic condition, which in itself has not a great mortality and which is spread over a number of years, is too great, it is not likely that one would with wisdom assume the danger involved. It has seemed to the writer that a fair and expected mortality in all biliary tract cases, as they come, should not be over 4 per cent. Yet an average through the Country is probably 8 per cent, with some operators of greater experience and skill going far below and others going far over this figure. When I show that in our Hospital the mortality rate for two years of individual operators has varied from 1.6 to 28 per cent, it is evident that there must be some difference in methods.

A recent writer says:

"Publicity is a wholesome sedative to the enthusiasm for operating which will not harm any clinic and may be one source of benefit in reducing mortality."

During 1927 there were 169 operations, by 23 operators, with 15 deaths, a mortality of 8.8 per cent. The trend of the times is toward removal so that all of these were simple cholecystectomies except

3 cholecystostomies
1 cholecystostomy with drainage of pancreatic abscess
2 cholecystectomies with choledochostomy
1 choledochostomy
1 cholecyst-gastrostomy.

TABLE I

OPERATIVE MORTALITY, 1927

Operator No.	Operations	Deaths	Mortality %
5	50	3	6.0
1	27	1	3.7
3	20	3	15.0
4	14	3	13.5
13	12	1	8.3
6	7	0	0.0
10	7	2	28.5
7	5	0	0.0
11	5	0	0.0
8	3	0	0.0
15	3	0	0.0
12	2	1	50.0
14	2	0	0.0
2, 9, 12 and 13, 16, 17, 18, 8 and 17, 20, 21, each 1	10	0	0.0
19, 23, each 1	2	2	100.0
23	169	15	8.8%

*Read in Section on Gastro-Enterology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

†From Garfield Memorial Hospital, Washington, D. C.

Choledochostomy carries a potential mortality of several times that of simple removal of the gall bladder, and yet, strangely enough, the mortality in this series was made mostly by the less serious operations. In *Table I* note the number of operations per surgeon and the mortality. Of those doing 10 or more operations, the death rate varied from 3.7 per cent in Operator 1 to 15 per cent in Operator 3.

In *Table II* note that while the mortality of the whole series was 8.8 per cent, the rate of the two operators who did 77 of the total number was only 5.1 per cent, or less than half of that of the 15 occasional operators whose death rate was 11.5 per cent.

TABLE II

SYNOPSIS AND ANALYSIS OF TABLE I

23 operators, 168 cases	8.8%
15 operators, 26 cases	11.5%
8 operators, 143 cases	8.2%
2 operators, 77 cases	5.1%

During 1926 there were 133 operations with a mortality of only 3 per cent. Only 13 men operated that year. These figures are consistent enough to prove that the larger the number of occasional operators, the higher the death rate.

In the two years there were, in the series studied, 302 cases with 21 deaths, a mortality of 6.9 per cent (see *Table III*). The mortality varying from 1.6 per cent of one operator to four times that figure evidences the fact that there must be more than a matter of hard luck entering into the higher mortality.

TABLE III

MORTALITY 1926 AND 1927

Operator No.	Operations	Deaths	Mortality %
5	87	7	8.04
1	62	1	1.6
3	30	3	10.0
4	28	2	7.1
13	21	2	9.5
8	15	0	0.0
7	10	0	0.0
11	10	1	10.0
10	7	2	28.5
6	7	0	0.0
15	4	0	0.0
12	3	1	33.3
14, 24, each 2	4	0	0.0
2, 9, 16, 17, 18, 20, 21, 22, 25, 26, 12 and 13, 8 and 17, each 1	12	0	0.0
19, 23, each 1	2	2	100.0
26	302	21	6.9%

It would seem that factors which enter into the causation of deaths may be divided into (1) errors of judgment, (2) errors of technic, and (3) unavoidable accidents and complications. Synopsis of the 21 deaths follows in the text. Study of the charts of these patients and analysis, to the best of my ability, shows that but three of the 21 could be classed as plainly unavoidable. In three others death may have been unavoidable or may have been due to errors in technic. In six cases, death could be attributed definitely to poor judgment, and in seven there was rather unquestionably an error in technic. In the last two there was, in all likelihood, error either of judgment, technic, or both.

Errors of Judgment.—One's judgment may be at fault, first, as to whether to operate at all; second, as to the proper time to operate; and third, as to what type of operation to perform. In none of this series has the last factor, the choice of operation, figured.

Every case of cholecystitis or gallstones does not call for operation. The condition of the patient may be such that operation carries more risk than does the disease. Both actual and potential risk should be estimated and it should be remembered that the surgical danger is immediate and the mortality from the disease may be spread over months and even years.

Second only to the determination of whether an operation is indicated or not is the selection of the optimal time for it. In general, it may be said that indicated emergency operations on the gall bladder are rare. One hears occasionally of ruptured gall bladder, but seldom sees it. Gangrene of the gall bladder does occur, but is usually tightly walled off. Acute inflammation, even with quite high temperature, does not often demand immediate operation. These cases can, nearly always, with proper medical treatment of starvation, ice cap, morphin and Murphy drip, be transformed into subacute or interval cases, or at least can be detoxicated so that they can be operated upon with but a fraction of the risk involved by operation during acute infections. I have seen high temperatures and high leucocyte counts come to normal even while pus still remained in the gall bladder, or even in the bladder wall.

Lastly, improper preparation of the patient for operation may be considered an error of judgment. Operation upon jaundiced patients without careful pre-operative treatment will probably treble the mortality. Complicating conditions such as heart disease, hyperthyroidism, high blood pressure and other troubles should all be passed upon by the internist and treated to reach the safest possible point for operation.

CASES OF ERROR OF JUDGMENT (6)

73,191 (5)—Admitted with x-ray evidence of influenza, involving the lung. Adherent gall bladder re-

moved. Stormy time from operation to death on tenth day with lung consolidation.

77 (23)—Operated as emergency for subacute cholecystitis. Temperature 101.6°, pulse 96, respirations 22. The patient stated that she was a bleeder, and bled to death one hour after operation.

75,804 (5)—Age 70, temperature 101.6°. Evidence of bleeding and infection from time of operation until wound broke down. Death on seventh day with temperature of 104°.

77,369 (4)—Woman, 67, with blood pressure of 200 cm. and some cardiac enlargement. Operated as an emergency, but nothing on chart indicated an emergency. Chronic gall bladder with stones. Died third day of a toxemia, probably uremic.

77,810 (4)—Six months pregnant. Temperature 99.2°. Leucocytes 14,500. Operated as an emergency, but only moderate inflammation of the gall bladder. Death on the table. Autopsy showed massive pulmonary infarct.

79,217 (1)—Hydrops of gall bladder with stones. Goitre with history of no toxic symptoms for five years. Death at end of second day with pulse of 160, due either to rapid infection or flare up of hyperthyroidism.

Errors of Technic.—Many errors in technic are possible, resulting in infection, hemorrhage, liver shock, adhesions and common duct obstruction. Several of these untoward results may occur in the same patient. In the cases studied, infection and hemorrhage have by far outnumbered any other immediate causes of death. Liver shock, unquestionably, may be superimposed on either of the other factors.

Errors of technic may be any violation of general surgical principles, plus neglect of any of the special precautions necessary to bile tract surgery. They are too numerous to mention individually. Infection may occur from within or without. Thorough isolation of the operative field is essential. Hemorrhage may occur, of course, from insecure ligation of the cystic artery. It may also come from an accessory blood supply and from trauma to the liver bed. Rough handling may cause shock and predispose to subsequent infection.

If the liver can be easily rotated and brought into the wound, it is perhaps admissible, but forcible dragging on the liver and keeping it down by packing, as advocated and practised by some surgeons, is, to the writer's mind, an indefensible procedure and one productive of much gall bladder morbidity. Better, by far, to dissect under greater difficulty, deep in the wound, than to have liver shock.

No one method can be followed in removal of the gall bladder. In some it is better to remove from the duct, upward, in some from the fundus, down, and in others by a combination of the methods. The method is chosen to fit the individual case from the standpoints of ease of removal and safety to the patient in recognition of structure. If there is a possibility of the common duct's being adherent, removal from above down, by careful dissection, is certainly safer.

Several points of technic, which have seemed important to the writer, may be mentioned. The cystic duct need not be removed too close to the bifurcation. Better to leave a bit of the ampulla of the gall bladder, as it will shrink completely, than to run the danger of scar or adhesions which may block the common duct.

Safe ligature of the pedicle is essential. Powerful, crushing, cystic duct clamps should be used. Twice, the use of these clamps in my experience has prevented possible death from hemorrhage from the cystic duct when the ligature was not properly tightened. In both instances the crushing clamp sufficed to keep the artery from bleeding until it could be recaught and re-ligated.

The next point deals with the method of treating the gall bladder bed. We are taught to close the peritoneal cuff over the raw bed from the cystic duct to the liver margin. When a nice rim of serosa is left on each side, this makes a finished job and theoretically should minimize adhesions. Practically the outcome is just as good when the bed is not closed over, as the two lobes of the liver tend to obliterate the space at once, and it is much better to let the bed entirely alone than to allow the suture to pass through a bit of liver tissue. If my sutures can catch serosa alone I close the bed, but if the margin is very narrow I do not run the risk of inducing oozing in an otherwise dry bed, and I have not noticed any difference in results.

Lastly, I feel that morbidity and mortality are both lowered by closure of the wound without drainage in suitable cases, which means usually. I have taken this up in another paper so that I will not repeat.

CASES OF ERROR IN TECHNIC (7)

72,374 (11)—Cholecystectomy with entire operation complete in 22 minutes. Blood and bile showed immediately after operation and death occurred next day from hemorrhage.

72,169 (5)—Chronic gall bladder filled with stones. Died fourth day from infection with ascending temperature and pulse.

74,104 (5)—Cancer of gall bladder. Wound broke down on tenth day. Resutured, but death occurred a few minutes later.

76,481 (3)—Patient, 33, walked in. Chronic cholecystitis. Died third day from combination of bleeding and infection.

76,298 (12)—Age 65. Subacute on admission. Medical treatment for two weeks with improvement. Adherent gall bladder amputated. Death from infection, starting third day.

77,819 (3)—Chronic, adherent gall bladder with stones. Died eighth day with infection, jaundice and hiccough.

78,903 (10)—Adherent gall bladder with stones. Death third day with rapidly ascending pulse and temperature. Autopsy showed acute peritonitis and salpingitis. (Tube was examined by several at operation with possible spread of infection.)

ERRORS OF TECHNIC OR JUDGMENT (2)

71,825 (13)—Ventral hernia, gallstones. Pre-operative condition good. Condition very poor after operation, with shock and brown vomiting. Rapid rise in temperature and pulse, with death next day.

76,592 (13)—Man of 66 years died 30 days after removal of gall bladder (pathological report, not inflammatory) after infection, resuturing of wound and prostatic complication.

It is impossible to say certainly whether a death is due to unavoidable accidents and complications or not, but in this series I have been able to find only three cases which were clearly unavoidable and three others which may have been unavoidable or may have been due to errors of technic.

POSSIBLE UNAVOIDABLE CASES (3)

76,919 (5)—Bloody fluid in the peritoneal cavity, probably acute pancreatitis. Gall bladder drained. Death on fourth day with fever and vomiting.

77,960 (10)—Chill and jaundice while being studied by the medical service. Stone in the common duct and cholangitis. Death four hours after operation.

76,846 (3)—Choledochostomy for adhesions following gall bladder drainage some years before. Good result until tube removed two weeks later. Profuse discharge and increasing toxemia with death one month after operation.

UNAVOIDABLE OR ERROR OF TECHNIC (3)

71,796 (5)—Adherent appendix and gall bladder removed in a patient with good pre-operative condition. Died third day from probable lung embolus.

77,358 (19)—Acute cholecystitis developed in the Hospital while being treated for fractured fibula. Temperature 102°. Acute, distended gall bladder drained. Death fourth day. Autopsy showed peritonitis.

79,094 (5)—Eighty years old. Third attack with pain and fever. Gall bladder, filled with pus, was ruptured at the time of operation. Died second day. Good deal of brownish discharge and increasing infection.

Case 71,796, dying from pulmonary embolus, may have been unavoidable or there may have been infection at the operation. Case 79,094 is particularly interesting as to whether there was an error in judgment in not waiting until the infection might have subsided, as it had with two previous attacks; as to whether error in technic in the rupture of the gall bladder during removal caused death; or lastly, if death was unavoidable in spite of operation.

As I have reviewed the history of my one operative death in this series, as well as two others in recent years, I feel that all might have been prevented.

One death due to tachycardia and exhaustion, from activation of a toxic thyroid, which had given no symptoms for five years, must be credited to an error of judgment. Another patient might have lived instead of dying from progressive infection if operation had been postponed several more days, as improvement had been continuous before operation, another error in judgment. The third patient died on the tenth day from septic pneumonia and infected wound. I do not know whether the infection was due to error of technic or whether judgment was at fault in operating while the patient had a slight fever.

Finally, I may say that while I may not have been correct in all my conclusions as to the causes of deaths in this series, the study has been valuable to me, and I believe that such an analysis may reduce errors of judgment and technic so that unavoidable accidents and complications may account for a mortality in the future much lower than at present obtains.

The Rochambeau.

Discussion follows paper of Dr. Niles, page 457.

NON-SURGICAL GALL TRACT DRAINAGE*

By GEORGE M. NILES, M.D.,
Atlanta, Ga.

The following comments are based upon eight years' experience in the above-mentioned procedure in over six hundred patients. The patients who have been drained only one or two times are not considered fair subjects for a clinical report; but those who have been drained five or more times may be included as proper subjects.

Of these patients, about 75 per cent exhibited symptoms of cholecystitis or cholangitis, separate or combined. These patients had "muddy" or slightly jaundiced complexions, complained of gaseous eructations, bad taste and fickle appetite. Nearly all were constipated, and nearly all had some tenderness over the

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*Read in Section on Gastro-Enterology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

right hypochondrium. In other words, they suffered from that loose, but expressive, term, "biliousness," a much abused term, but one which carries its own meaning. The majority of these patients gave a history of malaria, typhoid fever, or influenza, while many of them had had bad teeth or tonsils, or accessory sinuses. None admitted good digestion. About 5 per cent gave a history of one or more attacks of severe colic. In fifteen cases gallstone shadows were demonstrated, while in thirty-six cases a tentative, but probably correct, diagnosis of cholelithiasis was made.

Twenty-one cases of bronchial asthma are included, every one of which had previously undergone various and sundry forms of therapeutics.

Of chronic and severe migrain there were twenty-four cases. Three of these were semi-invalids when first brought under observation and care.

Chronic infectious arthritis furnished twenty-nine. Some of these sufferers also had lame backs and stiff muscles.

Twenty-six cases of jaundice in patients under forty-five were drained. Fifteen aged patients with deep and long-standing jaundice were drained, with scanty success, as to bile recovery, and no success as to improvement of the patients, every one of whom, sooner or later, succumbed.

In deciding whether or not non-surgical gall tract drainage should be undertaken, the writer wishes to advance the following postulates:

(1) No physician can expect to obtain a high percentage of good results, which last for several months or years, unless he is completely "sold" on the value of this procedure in proper conditions and is willing to infuse into his efforts thoroughness and sincerity. A careless or indifferent technic, a mental attitude that would "damn it with faint praise," or its use in certain states, to be later mentioned, will result in disappointment to the patients and perhaps discouragement to the physician.

(2) Chronic cholecystitis or choledochitis, digestive distress, lack of appetite, a history of typhoid fever, malaria or influenza, the syndrome, known under the loose term of "biliousness," offers a promising field for non-surgical drainage. Many of these patients have associated troubles such as chronic appendicitis, gastric or duodenal ulcer, or pericholecystitic adhesions, which gall tract drainage cannot cure; but that part of the pathologic picture depending upon an infected gall bladder or ducts generally yields promptly to this treatment.

(3) Biliary stasis, with chronic infection of the gall bladder following malaria, typhoid, constipation or some focal infections, may properly receive this treatment.

(4) Sick headache cases are either greatly benefited or practically relieved by this method, though in migrain of long standing quite a number of drainages will probably be required, and the course of treatment may extend over a considerable period of time. As many cases of chronic migrain have, to a greater or lesser extent, caused semi-invalidism for years, the sufferer is generally willing faithfully to follow out this procedure, which often offers the best chance of relief.

(5) Some forms of asthma, where the sensitization tests have not worked out satisfactorily and where it seems probable that the underlying cause of the asthma abides in an infected gall bladder, will give remarkably good results from biliary drainage. Many asthmatics are nearly desperate, and it can do no harm to try this, though a certain percentage will yield no results.

(6) As an adjunct to other therapeutic measures, it is worth while in infectious joint troubles, though quite a number of drainages may be found necessary.

(7) In catarrhal jaundice, where there is no material obstruction, such as a stone in the common duct, or a hydrops interfering, this method will frequently yield brilliant results. Occasionally a colic will follow, and, in a few instances, the ejection of small gallstones has been accomplished. In one instance the ejection of a large gallstone followed a biliary drainage. This was reported and published in the *Journal of the American Medical Association.*

(8) Patients with gallstones can be made much more comfortable by these drainages, whether or not the gallstones are later removed by surgery. Even after gallstones are removed it will be found helpful to have several drainages a few months after the operation. The writer has had a number of cases in which biliary drainages were administered pre- and post-operatively, and in every instance the patients were appreciative of the comfort derived.

(9) The writer believes that this method is in order as a pre-operative measure in nearly all of the operations upon the gall tract.

(10) There are many patients who have had surgical gall tract drainage, or whose gall bladder has been removed without permanent relief. Such patients may generally expect a liberal measure of relief from non-surgical drainage, and some, under the writer's observation, seem to have attained perfect health where surgery had proved unavailing.

(11) In a certain proportion of cases of gall tract disease surgery may be indicated, but, for various reasons, may be inadvisable or inexpedient. Many of these cases can obtain amelioration of disagreeable or painful symptoms with no risk. The writer has had under his care a number of aged individuals who were unable to withstand surgery, and in nearly every instance gall tract drainage has proved itself worth while.

The writer has under treatment and observation at present a number of patients in whom, after the administration of tetra-iodophenolphthalein, the gall bladder was either invisible or filled out unsatisfactorily. In some of these the gall bladder now, after several drainages, fills out decidedly better. Many such gall bladders may be restored to a comparatively normal function, though I have not observed a sufficiently large number to make any comprehensive claims.

STATISTICAL RESULTS

In compiling the results attained through eight years' work, comprising over sixty-five hundred non-surgical drainages, the writer feels that he can advance the following claims for this procedure, as applied by his method:

In 65 per cent the improvement is definite, the digestive symptoms are relieved or greatly ameliorated, and this desirable state of affairs has lasted from three months to three years. Some cases of cholecystitis or choledochitis have seemed permanently relieved; at least this relief has lasted from three to eight years.

In about 20 per cent the results have been fairly satisfactory, so that the patients have come back from time to time for additional drainages, but some of the uncomfortable symptoms have persisted to an extent.

Ten per cent either failed to return for further observation and treatment or were lost sight of.

In 5 per cent no good results were attained. Some of these were aged patients; some were of that temperamental trend who either objected to the slight discomfort attendant upon the procedure, or who failed to cooperate. In some others it is probable that either a faulty diagnosis was made or that there were other pathologic conditions which remained, and which could not be favorably influenced by gall tract drainage.

These statistics have been carefully compiled. They are from observation upon the writer's own patients and are not garnered from the reports of other physicians.

CONCLUSIONS

The assumption that this method will remove gallstones, will break up adhesions, will cure appendicitis or cancer of the liver, or remove deep-seated organic disease of the gall tract is unwarranted, and the patients should be so informed. In a number of cases the writer has been placed in an embarrassing position by having referred to him by enthusiastic believers in this procedure unsuitable cases, which non-surgical drainage could not benefit.

Furthermore, in the opinion of the writer, no physician should employ this method unless he enters into it whole-heartedly, performing it in a technically correct manner, and is willing to persevere in his efforts.

While neither the principle nor practice of non-surgical biliary drainage is as yet universally accepted, there is, nevertheless, a growing number of conscientious physicians who are employing it properly and obtaining satisfactory results.

In conclusion, the writer is convinced that this method will enjoy a wider and wider acceptance as time goes on and its merits become better understood, and that it will eventually reach a proper and honorable place as a recognized therapeutic procedure.

DISCUSSION (*Abstract*)

Papers of Dr. Verbrycke and Dr. Niles

Dr. Daniel N. Silvermann, New Orleans, La.—I have always been a firm believer in the use of duodeno-biliary drainage for diagnostic purposes, but less so for therapy. The writings of Chester Jones of Boston have struck the point. The method used in duodeno-biliary drainage must be to a great extent standardized. Unless

we make a study first of the whole stomach, then of the duodenum, and subsequently of the biliary tract, just as a urologist examines the bladder and the ureter and kidneys, we shall not obtain much information from a microscopic examination of the bile. The cases in which duodeno-biliary drainage is of value are somewhat limited. We are hardly justified in operating upon a low grade chronic cholecystitis and cholangeitis which show a negative Graham test.

Within the last two years I have had six physicians: two pediatricians, two internists and two surgeons with chronic gall bladder disease, and as yet I have been unsuccessful in convincing any one of them that he should have his gall bladder removed.

We have to be very careful in arriving at conclusions relative to improving the function of the gall bladder on the basis of the Graham test. We should have proper controls and adhere to true experimental data. Visualization of the gall bladder at one time is different from that at another, particularly with the oral method. You may give an individual the dye by mouth for two or three days, get no result and in a short time after an intravenous injection receive a report from the radiologist of a perfectly functioning gall bladder.

Recently I have examined a series of secondary and tertiary syphilitics with strongly positive Wassermanns and was surprised to find that in half a dozen of the secondary syphilitics the gall bladder visualized normally; in the tertiary syphilitics without clinical gall bladder disease, there was considerable deviation from the normal. So far my studies have been limited in number. All of these individuals were studied after intravenous injection of the dye. Some one suggested that this condition might have been due to hepatic damage. It has been shown that hepatic dysfunction is found in secondary syphilitics more than in tertiary syphilitics, except in that involvement of the liver which occurs in some instances of hepatic syphilis.

Dr. W. O. Floyd, Nashville, Tenn.—We have had at our hospital in Nashville exactly the same thing that Dr. Verbrycke has given us, that is, a resume of the gall bladder surgery for the past five years at a recent staff meeting, and it showed identically what Dr. Verbrycke has very beautifully shown us, namely: that the inexperienced or occasional operator or the man with less judgment has been the one who has had the far greater mortality rate.

As Dr. Niles said, if you choose to treat a patient by drainage with the duodenal tube, you cannot do him any harm. But it is very different when you treat him surgically, for you can do some harm and you may lose many of them if you are not an experienced operator. Some of the errors reported by Dr. Verbrycke would not occur, I am sure, under men with experience in handling gall bladder surgery, for example the management of the patient with jaundice and common duct stone.

Dr. Verbrycke did not state what was done in the patient with this condition, and whether or not the stone was removed from the common duct.

Dr. Verbrycke.—The stone was removed. There are few, if any conditions of the abdomen, probably nothing but acute intestinal obstruction, which carry such a high mortality rate as does stone in the common duct.

Dr. Floyd.—Perhaps a local anesthesia and hurried drainage of the gall bladder to rid the patient of the jaundice and removal later of the stone would have been the ideal thing to attempt. This patient, however, might have died with so much surgery, or the pancreatitis might have produced the fatality without any surgery. But certainly it was a very serious mistake to spend time in removing the stone in this case.

Dr. C. S. Danzer, Brooklyn, N. Y.—I have never been able to understand why magnesium sulphate that is introduced through the duodenal tube acts differently from the very same thing given by mouth. I have seen patients who have taken on an empty stomach Carlsbad salts, which is essentially a mixture of sulphates, have a bowel movement that consisted almost entirely of bile. I will confess that I have seen one patient with jaundice who did not improve under the oral administration of the sulphates but did after duodenal drainage.

Dr. Verbrycke (closing).—As to preliminary use of drainage before operation, I do not know what Dr. Niles would do if he were told to go out and get a hornet's nest. I think I would sneak out in the night, wrap a blanket around it and try to get it without disturbing the inhabitants. I regard these gall bladder cases as just as serious, and I should be afraid that I might start infection, stirring up quiet germs into activity, by the preliminary use of the drainage tube.

Dr. Niles (closing).—Extensive and elaborate hospitals are being built all over this Country, which cost millions and millions, and you know where a million dollar hospital is dedicated to surgery, surgery will be done. That follows as day follows night. Now in many instances, it is not for me to say whether surgery was ill-advised or proper, but, when possible, the patient should be given the chance of recovering without an operation.

A paper was read at a well-known Northwestern Clinic several years ago, in which the writer proved to his absolute satisfaction that there was nothing to this method, and still today non-surgical gall tract drainage is being carried on in that clinic.

In reply to Dr. Danzer's question, if you put salts in the stomach where there is an acid reaction you will get only a hydragogue cathartic effect. One of the members of the Rockefeller Institute enunciated this principle, that if magnesium sulphate is put in the duodenum you get contraction of the gall bladder and relaxation of the muscle of Oddi; but if you put it in an acid stomach you get simply a cathartic effect.

I believe there will be an increasing number of physicians who will use non-surgical drainage in properly selected cases of gall tract disease in the future.

DISTURBANCES OF THE INTERNAL GLANDULAR SYSTEM IN VARIOUS NEUROLOGICAL CONDITIONS*

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The mass of material at one's disposal in discussing or preparing an address on this topic is so great that it is rather difficult to choose groups of cases that will in a comparatively short time indicate what the entire mass might show if it were presented. I have endeavored to take from this mass of material two types of endocrin disturbances which are correlated with an innumerable number of types of neurologic conditions; that is to say, the neurological conditions which are represented by two large endocrin types are legion. The first of these two groups is characterized by behavioristic anomalies, largely in children and in the adolescent, less frequently present in the adult. These behavioristic anomalies are of a character which might be dubbed incorrigible, for want of a better name. The patient is not subversive to discipline; he reacts rapidly and destructively to any chastisement, and he is actively negativistic to all approach. Within the past ten years many such cases have come under our observation with their chief complaints incorrigibility, non-amenability to discipline, or assaultiveness. They were easily aroused to a high pitch of anger at the slightest provocation, a word, an insinuation or even a glance being sufficient to arouse intense antagonistic reaction. These cases became problem cases at home, or at school, or in whatever environment they found themselves because of their non-adaptability and uncompromising attitude. Occasionally their behavior became so exaggerated that apparently hypomanic states developed therefrom and several of these patients had to be confined in institutions until their symptoms were ameliorated. At home, a harsh word from any member of the family at table, for instance, would result in a plate or knife or other utensil being thrown at the aggressor. In school, a blow, or a shout or a curse would be hurled at a fellow student, or even at the teacher. Because these cases seemed gradually to the observer to have many points in common, such as stature, bodily features and biochemical conditions, it seemed important to see whether they formed an actual group which could be differentiated by certain stigmata, both in the physical and biochemical domains. We have here collected a representative group of such cases and arranged and classified them in such a way as to bring out some of the common correlated features.

One of the first characteristic physical signs which can be elicited on an examination of these patients is that of myotatic irritability and myoidema. On striking forcibly with a percussion hammer, the muscle mass of the deltoid or the pectorals, a local muscle contraction is seen together with a sudden swelling of the immediate area struck. This swelling is known as myoidema and this muscle contraction as a sign of myotatic irritability. Practically all of our cases in both children and adults show these physical signs of myotatic irritability and myoidema; some to a greater degree than others; in some, this myotatic irritability was increased to such a point that a Chvostek reaction of moderate degree was obtained. From experiments made by a number of investigators, notably McCallum and Voegtlein,[1] it has been shown that this muscle irritability and excitability are due largely, if not entirely, to a diminution in the utilization of calcium. The unanimity with which myotatic irritability is found in this entire group of cases is striking. The converse, however, that all cases with myotatic irritability and myoidema have the behavioristic qualities that this group shows is not true to the same extent, but is nevertheless sufficiently prevalent to awaken suspicions of conduct disorders whenever these physical signs are evoked. The best site for eliciting both myotatic irritability and myoidema is at the shoulder, over the deltoid and pectoral muscles.

As was before stated, because of the correlation between muscle irritability and calcium nonutilization, we next undertook the examination of the calcium content of the blood. Our laboratory determines the calcium content of the whole blood, not merely of the serum. The normal values are from 6.5 to 9.5 milligrams per 100 c. c. of whole blood. From the charts you will see that of twenty-three cases nineteen showed a deficient blood calcium, varying from 5 mg. per 100 c. c. to 8 mg. per 100 c. c. (*Chart 4*). The four cases that showed an apparently normal blood calcium are of interest for the reason that treatment, as will be hereafter indicated, was just as efficient with them as with the other nineteen cases that showed a deficient blood calcium. This led us to suppose that it

*Read in Section on Neurology and Psychiatry, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

was not so much the deficiency of calcium in the blood that determines the disturbances as it was the calcium utilization which under our treatment seemed generally to be increased. It is curious to note that in many of the cases of low calcium content in the blood there was an increased calcium deposit in various portions of the body, producing thick skull tables and particularly that there were calcium deposits in the pineal gland. In some of our older cases, these calcium deposits were also demonstrated by x-ray to be possibly in the choroid plexuses, and in one case in the walls of the internal carotid artery. Because some of our patients showed signs referable to the pineal gland, we next undertook to study this gland as far as it was possible to do so.

In this respect it is interesting to note that of nineteen cases in which the skull was examined with x-ray, fourteen showed a pineal shadow in spite of the fact that they were all children of the age of sixteen or under, a comparatively rare finding. Whether this pineal calcification is simply a part of the calcium metabolic disturbance in the individual, or whether it represents a pineal involutionary process, it is difficult to say. If it represents a pineal involutionary process, one would expect to find some structural or metabolic effect. As a matter of fact, in five of our cases of pineal shadow, we had such symptoms as enlarged clitoris and breasts (one case), pubertas precox (one case) and enlarged genitalia in boys (three cases). In several others, psycho-sexual precocity was pronounced. Whether the pineal effect on muscular activity,[2] as has been stated, is a fact or not, it is interesting to note that a large percentage of our cases showed intense muscular fatigability (see *Chart 4*). Indeed, almost as frequently as the patients were complained of because of their incorrigibility and quickness of temper were they brought for examination because of undue fatigue. An additional reason for coming to the physician's office was because of deficiency in growth. The general impression with us was that their general average height was considerably below the normal.

And so the next interesting observation of these cases pertained to growth in length. Of nineteen cases in children, in which six were of normal height, four were between two and four inches below average height for age and nine were four inches or more below the average height for their age; these figures showing a tendency toward dwarfism. When we realize that the calcium utilization is deficient we can readily understand how part of the non-utilization might readily have affected the growth of the long bones (see *Chart 4*).

Treatment, as will appear, tended to increase rapidly the growth of some of the patients.

The fatigability before touched upon led us further to examine our cases for blood sugar, for, as is well known, a deficiency in this respect is usually the cause of rapid fatigability. To our surprise our findings were that this was increased rather than diminished and that running in inverse proportion to the blood calcium was the blood sugar content. Only two of our cases had blood sugars below 100 mg. per c. c.; twelve being between 110 and 140, and this in children under sixteen years of age. Low calcium with high blood sugar has been noted in some types of diabetes, although none of our cases had glycosuria[3 6] (*Chart 4*). The fatigability, whatever may have been the cause, or combination of causes, was therefore certainly not due to a low blood sugar.

In the routine procedure of examination we were further brought to the question of blood pressure in our cases. Although the patients here illustrated were sixteen years of age or under, fourteen out of seventeen had blood pressures above 100, ten above 110 and five about 120; one girl, eleven years of age, had a pressure of 140 systolic. Whether the high blood sugar and the high blood pressures are secondary to sympathetic disturbance, involving, perhaps, also the adrenals, or the pituitary, is something to be thought of. Indeed, with the rather high sugar mobilization, both adrenal and pituitary glands might well be considered in connection with the comparatively high tension (see *Chart 4*).

But the outstanding complaint, the condition in our patients that evoked the greatest criticism and awakened the most intense concern, was the abnormality of their behavior. As above stated, this varied from the simply incorrigible and

CHART 4

(Patients Under Sixteen Years of Age)

Blood Calcium.		Blood Sugar	
5-6 mgm. per 100 c.c.	6	120—140	5
6-7 mgm. per 100 c.c.	9	110—120	7
7-8 mgm. per 100 c.c.	4	100—110	1
8-10 mgm. per 100 c.c.	4	Below 100	2
Blood pressure.		**Pineal shadow:—**	
Above 120	5	Present	14
110—120	5		
100—110	4	Absent	5
Below 100	3		
Growth Defects:			
4″ or more below average height for age			9
2″-4″ below average height for age			4
Normal			6

CHART 1.

Name: Age: Sex:	Blood Calcium	Myotatic Irritability and Myoidema	X-Ray Examination	Other Glandular States	Behavior	Other Symptoms
GMW 15 M	6.1	Excessive	Pineal calcified; small sella; thick skull tables.	Enlarged genitalia.	Manic outbursts; uncontrollable.	Great fatigue.
JG 11 M	6.2	Excessive	Pineal calcified; small sella.		Assaultive; incorrigible; threw knife at father.	great fatigue; muscular cramps.
R Go 11 F	7.1	Very marked	Pineal calcified.	Enlarged clitoris and breasts.	Incorrigible; assaultive; curses.	Fatigue.
R Gn 11 F	6.8	Very marked	Pineal calcified; very small enclosed sella.	Enlarged genitalia.	Quarrelsome; assaultive; unmanageable.	Fatigue.
V S 14 M	7.5	Marked	Pineal calcified; thick skull tables.		Tenseness; easily angered; stammers.	Fatigue; still has deciduous teeth.
DHE 16 M	7.8	Very marked	Small, enclosed sella.		Assaultive; forges checks; police case.	Fatigue.
NSL 16 M	7.1	Excessive	Pineal calcified.	Thyroid enlarged.	Incorrigible; easily angered; curses	Fatigue.
M F 15 M	7.2	Very marked	Pineal calcified; small enclosed sella; thymus enlarged.		Irritable; incorrigible; stammers.	Fatigue.
J W 9 M	6.2	Excessive	Small sella; convolutional digitations.		Impatient; easily angered; quarrelsome.	Fatigue; headache.
J M 15 M	7.2	Excessive	Cranio stenosis; oxycephalic; thick skull tables.	Thyroid full.	Easily excited and keyed-up; extreme tenseness.	Fatigue; tenseness of neck muscles
J G 12 F	6.8	Excessive	Pineal calcified.	Menses at 11; pubertas praecox.	Incorrigible; violent temper; curses.	Thyroid full.
A B 14 M	6.9	Very marked	Pineal calcified; thymus enlarged.		Incorrigible; undisciplined; assaultive.	Retarded I. Q. 80%; fatigue.
M C 14 M	5.9	Excessive	Pineal calcified; thick skull tables.	Enlarged genitalia.	Violent temper; irresponsible.	Poor muscular coordination.
V A 7 F	5.9	Marked	Digitations more than normally visible.		I. Q. 58% cannot talk; excitable.	Fatigue.

CHART 2.—(ADULTS)

A P D 29 M	5.4	Marked	Enlarged pituitary	Thyroid full	Easily aroused and then so blocked he cannot talk; excitable.	Fatigue; trismus; muscle cramps.
E C 26 F	6.0	Marked	Pineal shadow; small pituitary.		Cannot concentrate and mind tense and immobile.	Fatigue; scant menses; tense.
C B D 46 F	6.8	Marked	Exceedingly thick skull tables.		Excitable; uncontrollable.	Fatigue; urticari; tense; no relaxation.

CHART 3.—(NORMAL BLOOD CALCIUM)

J L 5 M	10.0	Marked	Persistent thymus needing x-ray at eight months; sella quite small.		No self-control; violent; temper tantrums.	Fatigue.
J Y 9 M	10.6	Marked	Persistent thymus; x-ray treatment of thymus at eight months.		Uncontrollable and violent; lack of self-control; domineering.	Fatigue.
G B 8 M	10.5	Marked	Sella slightly smaller than normal.		High temper; deficient; irritable.	Fatigue.
J C 14 M	9.9	Marked	Pineal calcified; thymus present.	Large genitals.	Assaultive; bad; incorrigible; undisciplined.	Fatigue.

quarrelsome type to assaultiveness and exhibitions of the most violent temper, reaching the point of hypomanic disturbance. Whether these behavioristic qualities are due to the defect in the calcium utilization or to some of the other factors that we have here been discussing, is a moot point. It seems to us, however, that not only because the low calcium utilization is the most constant factor, but also because of the effect of non-utilization of calcium on the muscular system, the behavioristic anomalies may belong to the same category, depending upon the non-utilization of calcium by the nervous system. It has been shown by a number of previous investigators[4] that a diminution in calcium supply to the blood results in an increased reaction of nerve tissue to an induction current. It is very possible that the same factors that bring about myotatic irritabilty in the muscle also bring about untoward reactions in the nervous system. That is to say, reaction follows stimulus so rapidly that the overt act is committed before reason and judgment can come into play for purposes of inhibition.

A word should here be added, that this speed of nerve reaction is perhaps also the basis for the wit and precocity shown by these individuals, qualities which they all possess.

In order to determine whether a lack of intelligence possibly also underlay their conduct, they all underwent intelligence tests. They were found for the most part to be not only remarkably witty and precocious in their replies and reactions, but were in the main intelligent as well. Theirs is not the incorrigibility and bad temperedness of the moron and the defective, for of all our cases only one showed on psychometric testing an intelligence below normal (intelligence quotient 58 per cent, case V. A.). Indeed, in school these children were among the very brightest and highest in scholastic standing.

TREATMENT

Because of the manifest calcium disturbance, all of our cases were treated at first basically and primarily with calcium in varying doses with very little effect, although at times reports of improvement were made which with difficulty could be substantiated at either clinic or office. We then added in the earlier cases, for the generally accepted theory of its specific action in calcium metabolism, parathyroid gland in the usual commercial tablet form. Here again, some effect was really observed in a reduction of the intensity of the muscular reactions, as well as in the conduct abnormalities. Finally, a few years ago, we obtained for experimental purposes Collip's "parathormone" which was said to represent the active principle of the parathyroid gland.[5] This preparation was given hypodermatically in doses varying from 5 to 7 minims per dose. The effect was quite noteworthy. The tenseness, the myotatic irritability, the conduct disorders were quite rapidly ameliorated; growth was increased in speed; the calcium content of the blood was increased to normal ratios, and these effects were noted as well in those cases that had apparently a normal blood calcium content as in those of low calcium values. (From this the conclusion was drawn that it was not necessarily the blood calcium content that mattered, but the utilization thereof that was of importance, the parathyroid gland producing this utilization.) We now have a well formulated treatment outlined consisting of calcium lactate by mouth, or calcium gluconate hypodermatically, parathormone hypodermically, sunlight direct or by artificial means regularly administered. The results warrant all these measures, for among children and adolescents our patients practically all improve, of course, in different degrees. The adults were benefited also, with exceptions, the reasons for which exceptions we have not been able to determine. The basis of the treatment we feel to be the administration of parathormone, for upon it turned the success of therapy.

A word should be added on the danger attendant upon the possible hypercalcemia produced by this treatment. Such hypercalcemia causes nephritic irritation as evidenced by albuminuria with casts, and must be guarded against by frequent urinalyses and examinations of blood calcium content. One quite safe method which we pursue is to give the parathormone for two weeks with an interval of freedom for one week.

GENERAL SUMMARY

We, therefore, are confronted with a number of cases of close resemblance to one another in several important particulars, namely: gross behavioristic abnormalities with deficient utilization of calcium, parathyroid deficiency, and pineal involvement with secondary disturbances in growth, blood pressure and gonadal development. This syndrome is easily recognizable, is frequently encountered and lends itself to therapeutic attack. Thus, the first group with a defi-

nite endocrin-biochemical basic disturbance is seen to represent a huge number of cases in practically every field of general medicine, but particularly in that of neuro-psychiatry. And the attack on their problem is not a psychologic one nor an environmental one, but almost entirely an endocrin-biochemical one. As time goes on we shall undoubtedly be able to separate from the large so-called psychogenic group of diseases many sub-groups dependent upon some similar deficiency characteristics as the class just analyzed and just as amenable to treatment.

Now, let us take up the second group of cases. This is a group which we also have called psychoneurotic, the psychogenic factors of which we have tried always to find. Many of these cases are due not to the immediate apparent cause, a domestic disturbance at home with wife or husband, a fear of disease processes, business worries and so forth and so on, exhibiting all those symptoms that we know, all those critical periods that we have seen and believed to have been productive of these conditions, but which have been actually produced potentially in early constitutional life or in hereditary transmission. They are cases that spring from a hypoplasia, originally dominated by a large thymus gland, with a hypoplastic cardiovascular system; underactive pituitary gland, suprarenal gland and genital organs and a disturbed biochemistry; the well-known status hypoplasticus of Bartels.[7] Such an individual gets along very well until he exceeds his margin of safety, which is extremely narrow. Between those of this group that die in early life from the enlarged thymus, or its correlatives, and those that go on to cure through automatic compensation[8] in later life, there are any number of cases that fall by the wayside before arriving at normal levels. These are the cases we see at critical periods of their life. They all show disturbances in some or all the domains which are characteristic of the hypoplasic state.

The automatic compensation for these difficulties is by virtue of the overactivity of the pituitary, thyroid and adrenal glands. Each of these in turn has its function to perform to increase the blood pressures, the blood sugar, to maintain the body temperature, to regulate the skeletal growth, the steady development of the various tissues and organs, and as the hypoplastic state is one in which all these are deficient, such overactivity on the part of these glandular mechanisms is conducive to a compensation which gradually brings the individual to a normal level. However, in the case of each of these glands, overactivity also brings about symptoms apart from those desired for compensatory purposes. The chief unit of such disturbance is the pituitary body. The reason for this lies in its anatomical position and relationships; that is to say, within a bony capsule in close juxtaposition to the cavernous sinuses with their contained oculomotor nerves, and with the optic chiasm. Enlargement of the pituitary, therefore, as a necessary accompaniment to an overactivity may readily, through pressure on the sella, produce headache and cause disturbances to any or all of the near-lying structures. Such headache and disturbances frequently are the basis of the complaints made by those so-called psychoneurotic patients. The headaches are thus seen to be evidence of a compensatory process, not a disease process. The recognition of the potential compensatory factors, as above stated, leads us to a therapy based upon their only partial success in these attempts, namely: a therapy consisting of the administration of pituitary, thyroid and adrenal products at proper times with proper dosage.

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DISCUSSION (*Abstract*)

Dr. R. M'G. Carruth, New Roads, La.—For the past twenty years I have done some research work along the line of the unlimited propagation of the unfit, and feel impelled to ask, until the science of endocrinology, which now seems to hold out considerable hope, shall have sufficiently advanced to cure these cases, what, in the meantime, have we to advise? Not only the uninformed laity, but many physicians still balk at sterilization. To quote the words of a distinguished heart specialist in a recent paper on the heart, and the role that syphilis plays in the present alarming increase of sudden deaths, I here repeat that the medical profession has been derelict in not explaining to the laity the extreme simplicity of and the entire lack of danger in the operation of sterilization and the vast benefits therefrom to accrue to future generations.

FATAL EMBOLI FROM THROMBOSES OF GREAT BLOOD VESSELS: THE CONCEALED THROMBUS*

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It is so inborn in medical men to fear the detachment of an embolus from a thrombus, especially from a thrombus that is occluding one of the great vessels, that we rarely, if ever, stop to think just how much justification there is for that fear. In a way, it is just as well that this is the case, because forewarned is to be forearmed, and certainly extra care does no harm. At the same time, the truth should be known, and it is on this account that I wish to record certain observations that may be helpful in an evaluation of this subject.

I daresay that the greatest number of all the thromboses that we see and are able to recognize are those that occur in connection with varicose veins and varicose ulcers. And not only this. One finds here the thrombotic process in all its various stages, shades and gradations, as he will find it nowhere else in the body. The entire saphenous vein tree from the ankle to the groin may be involved or only a segment thereof. Sometimes there is only a small isolated area. However the case may be, and whether there has been a small involvement or a large one, whether there has been actual abscess formation or just a phlebitis with extensive clot formation, I have personally never known of a fatal pulmonary embolus which was liberated from one of them. And over a long period of years, during the course of which I have been actively engaged in out-patient work at the Johns Hopkins Hospital, I have been consciously looking for it.†

This is all the more remarkable because much of our teaching of surgery at the Hopkins is done in the dispensary and upon occasion I have come across the tightest kind of pressure bandage mistakenly applied by a student to an acutely thrombosed vein. Furthermore, since practically all the patients are in most moderate circumstances and cannot remain off their feet, they not only continue most of their activities, but walk to and from the Clinic for treatment. Surely if there were any great danger of embolism from this process, as we have always been led to believe, there should have been an occasional instance of it at least among the many patients.*

Just why these varicose vein thrombi should be tough is, of course, a debatable question. Since they are of infectious origin for the most part, probably the organization process starts quite early and certainly it becomes most complete, as is evidenced by the pronounced fibrosis of even comparatively young clots. But it may be that the very tortuosity of the vein itself is a protecting factor. The angular entrance of the saphenous vein into the femoral vein may, too, be of some importance. Indeed, I sometimes have the impression that this latter anatomical condition is fundamental. And the basis for this assumption is had in the observation that a thrombosis of the saphenous vein rarely, if ever, goes over into the femoral vein. In other words, we may have the most extensive involvement of the superficial venous tree; there may even be a progressive rising thrombus that looks most ominous, especially as it approaches the groin, yet for some unknown reason that thrombus almost invariably stops at or about the femoral opening. It does not break off to give rise to an embolus and it does not work its way into the femoral vein. We fear it always, but it is like many other things we fear; it rarely comes to pass.

Indeed, the femoral vein thrombi are things apart. Occurring upon occasion after childbirth, as the phlegmasia alba dolens or milk-leg, they, too, have always been dreadfully feared. Yet never have I personally known of one which gave rise to a fatal embolus, though I have seen

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*Read in Section on Surgery, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

†This paper is concerned only with fatal emboli. Showers of emboli and minor grades of infarction are of rather frequent occurrence, especially after postoperative phlebitis of the veins of the lower extremities and phlegmasia alba dolens. But while alarming, for some unknown reason they rarely cause death.

*Just how innocuous thrombosis of varicose veins is, is also well illustrated by the experience of those engaged in the injection treatment of the condition. Embolism is hardly considered as a possibility. Dr. J. S. Tunick, of the Hospital for Bone and Joint Diseases of New York, has done some 15,000 cases without a death. (Personal report to Dr. Howard M. Kern.)

Professor K. Linser has never observed an embolus in his injection series of 15,000 cases. (See H. O. McPheeters and Carl O. Rice, "Varicose Veins," J.A.M.A., October 13, 1928.)

a number in consultation.* It is the same with those cases of femoral vein occlusion that occur after surgical operations. Greatly feared, certainly potentially dangerous, it must be rare that they give serious trouble, other than that of a circulatory nature in the part affected, since I have never seen it, and the nature of my work would bring it to my attention if it were of real importance. Furthermore, I have been consciously looking for that, too.

And just as a saphenous vein thrombus rarely, if ever, goes over into a femoral vein thrombus, so, too, the reverse rarely, if ever, occurs. This is a most wise provision of Nature, because if both the superficial and deep sets of veins were to become occluded at the same time, the blood return would be so seriously deranged as to give rise to a threatened, if not actual, gangrene. As I say, we have gotten so in the habit of taking things for granted that such a remarkable phenomenon as that just mentioned has all but gone unnoticed.

If, therefore, the femoral vein thromboses and the saphenous vein (varicose) thromboses, rarely, if ever, occur in the same limb at the same time, and if they are comparatively innocuous as regards fatal emboli,† it is fair to ask which veins are dangerous when they become occluded. The answer to this must be that, certainly for the most part, it is those that can neither be seen nor palpated; in other words, concealed thromboses. And of these the pelvic veins and the veins of the neck must be the most important, since it is following infections and operations in these localities that most of the embolic accidents come to pass. Why this should be is once more a question, especially as regards the pelvis, though one may surmise that in the neck the short distance to the heart, together with the heavy negative pressure pull of the venous current, is mostly responsible.

In the light of these observations, then, it would seem that we are laying too much emphasis on one phase of the situation and too little on the other. Instead of greatly fearing the obvious vein occlusions and instead of taking elaborate precautions to prevent something that apparently is quite a remote possibility, we should direct more attention to the problem of the concealed thrombus. This is more easily said than done, it must be granted, because diagnosis is rarely made, the fulminating, septic thrombi excepted,* until an accident actually comes to pass. But once we recognize that it is the hidden, obscure vein clottings that most often throw off the fatal emboli, greater effort might be made to prevent their formation in the first place and more intensive study might be directed toward their detection, if present, in the second place.

Dry wounds promote healing and prevent infection and hematomas are bad. These things are known and are recognized, but we hurry in our work and grow careless, and I daresay certain of the complications mentioned occur as a result. Just so, too, slow, irregular, unaccountable mild post-operative fevers are most often passed over with scant consideration, but we know that they are not right, and it may be that, upon occasion, at least, concealed thrombi are responsible. We might give the matter more study if we once got it clearly in mind that it is this variety of thrombus that causes most of the serious embolic accidents.

But whether this is true or not, nothing will be accomplished so long as we continue to hide behind the bush. I refer to the prevalent custom of looking and acting self-righteous and injured in the presence of an embolus that has broken loose and ricochetted its way to its final resting place, in the face of a clean wound and healing per primam. Emboli do not just happen. They must have a point of origin and if an operation has been done the probabilities are that there has been a thrombosed vein at or about the field of operation. And it follows that in all likelihood there has been some low-grade infection present there or perhaps a hematoma or both. The clean wound and the nice healing have nothing to do with the question, since they concern only the superficial tissues and skin.

The trouble with the situation is that throughout the years we have accustomed ourselves to the idea, whether true or not, that a certain number of embolic deaths are bound to happen

*A questionnaire sent out for me by Dr. I. A. Siegal to the obstetricians of Baltimore reveals the fact that, whatever the incidence of phlegmasia was formerly, it is now extremely low (in Baltimore, at least), being hardly as high as 0.5 per cent, while the embolus percentage is hardly more than 0.05 per cent. In one series of 2,800 cases delivered the incidence of phlegmasia was only 0.3 per cent, of emboli 0.1 per cent, of death from emboli 0.034 per cent.

†In a very interesting article that appeared under the title "Post-Operative Phlebitis" (Arch. Surg., August, 1927), Dr. George E. Brown, of the Mayo Clinic, reports a series of 87 cases of phlebitis in which fatal pulmonary embolism did not occur once, though pulmonary infarction was recognized in 33 per cent. Hampton and Wharton, in an article on "Venous Thrombosis" (Johns Hop. Hosp. Bull., vol. 21, No. 350, April, 1920), report 205 cases of post-operative thrombo-phlebitis of the lower extremities, with only three cases of pulmonary embolism.

*Endocarditis is not considered in this paper.

in surgical practice, that they occur most often suddenly, unaccountably, out of a clear sky, as it were, and that they cannot be avoided or prevented. It amounts to nothing more nor less than a state of mind. Our preceptors have taught us this and we, in turn, are handing it down the line. The result is that little or nothing of an investigative nature has been done about the thing in recent years,* and now we find ourselves in the very embarrassing position of facing a sudden, widespread, unaccountable increase, I was about to say in this Country, but it is really throughout the world, of deaths from the cause under consideration, with nothing more to go on than we have known for the last twenty-five or more years.

The physiologists have gone to great lengths to explain the process of blood coagulation. Years ago Dr. William H. Welch† wrote his well-known articles on thrombosis and embolism, wherein he pictured the structure of the thrombus, told how it arises and elucidated his idea of the embolus. But neither the physiologists' theories of blood coagulation nor Dr. Welch's ideas on thrombosis and embolism, admirable though they are, give us the clue that is needed to solve the mystery of those post-operative clottings that often end disastrously. And I, for one, am of the opinion that we shall continue to remain in the dark until we know more about the life cycle of the clot as it occurs in its most natural habitat which is, of course, the vein. We know, thanks to the physiologists and Dr. Welch, how it may arise and we also know something about its later life, such as its organization and canalization. We do not know much of its middle life. Under what circumstances is the embolus thrown off? Why does not every thrombus eventuate in an embolus? And why does it frequently show itself at about the time the patient is ready to leave the hospital, that is, a week or ten days or two weeks after the operation? Does the thrombus become more brittle at this time? These and a host of other questions remain to be answered and if they are answered it may be that this serious complication can be overcome.

Among my observations the most interesting and remarkable finding was that thrombosis of the saphenous vein rarely, if ever, eventuates in thrombosis of the femoral vein, and, vice versa, femoral vein thrombosis rarely, if ever, causes thrombosis of the saphenous vein. That is, the two sets of veins are practically never put out of commission in the same leg at the same time by thrombus formation. Furthermore, it is rare, indeed, that a fatal embolus is thrown off from a saphenous vein (varicose vein) thrombus. Fatal emboli are thrown off from femoral vein thrombi, but these are such uncommon occurrences that they almost can be ignored. The conclusion must, therefore, be reached that most of the fatal emboli that occur after surgical operations come from thrombi that are concealed, unsuspected, silent. And it is not the long vein of the extremity that is dangerous when it becomes occluded; it is the short one of the pelvis and the neck.

This present paper is in the nature of a foreword, a preliminary survey that was in order before certain experimental work which is now under way at the Hunterian Laboratory of Experimental Surgery of the Johns Hopkins Medical School could be undertaken.

1814 Eutaw Place

DISCUSSION (*Abstract*)

Dr. Alfred P. Jones, Roanoke, Va.—All of us are familiar with this most dramatic accident which can occur, and certainly we have all been in the dark as to what to do about it. The fact that most of these accidents occur at just about the time the surgeon thinks all danger is past is disconcerting. Frequently they occur as the patient gets up and is about ready to go home, which suggests that the beginning of exercise has dislodged a thrombus from some pre-existing focus. A resume of this subject published in the last number of *Surgery, Gynecology and Obstetrics* is interesting. There I ran across the suggestion that it might be possible to prevent the formation of a thrombus by early exercise. In the early days have the patient turn frequently to prevent stasis in the veins. Trauma to the vessel wall and stasis, and infection, are all necessary for the formation of a clot. The effect of trauma and infection have long ago been emphasized, and if we can help to prevent stasis this may have something to do with the prevention of the embolus.

Dr. Bernheim's statement that he has never seen a fatal embolus follow thrombosis of the femoral vein is our experience, and is very astonishing. Just why it is I hope he will determine.

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*Henderson, Earl F.: Fatal Pulmonary Embolism. Arch. Surg., 15:231-236, Aug., 1927.

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Rowntree, Leonard G., and Shionoya, Takuji: Studies in Experimental Extracorporeal Thrombosis. Jour. Exp. Med., 46:7-12, July 1, 1927.

†Allbutt and Rolleston: System of Medicine, vol. 6, p. 691.

TREATMENT OF SENILE KERATOSES*

By EVERETT S. LAIN, M.D., F.A.C.P.,
Oklahoma City, Okla.

Several authors have seen proper to classify superficial keratoses into three types, based on different clinical though similar morphological pictures. The types are: (1) nevoid; (2) verrucous; (3) keratoid. I shall today discuss only the latter class, the keratoid type, which is most common on the exposed surfaces of those past middle life.

The prime object of this presentation is to introduce for your consideration a method of treatment for senile keratoses, which in so far as we are aware, originated in the office of Drs. Lain and Roland about fifteen years ago and has since been a daily routine in such cases. For a proper appreciation of the value of this treatment it is essential that a brief review of the etiology and histopathology be considered.

Etiology.—Careful observation and clinical experience of dermatologists have suggested that the chief etiological factors in this disease may be classified as predisposing and direct.

Predisposing factors are:

(1) *Heredity.*—There are racial characteristics of skin texture, such as the lack of sufficient skin pigment for protection against certain stimulating heat and light rays. Xeroderma pigmentosum is a most striking example of this hereditary predisposition to keratosis.

(2) *Age.*—This disease occurs most frequently after middle life, or in those whose skin appears prematurely old.

Direct factors in the etiology are:

(1) *Occupations.*—Certain vocations of life subject the predisposed person to long periods of irritating rays of light and heat or extremes of weather.

(2) *Habits.*—Improper cleansing of the exposed areas of the body, of accumulations, of sebum, dirt, perspiration or other irritating debris may be a cause.

In the light of recent research, another predisposing factor may be possible, namely, some dysfunction of the endocrin glands which partially regulate excretions of the sebaceous and sudoriparous glands.

Histopathology.—The histopathology of senile keratoses or, as designated by some, seborrheic keratoses, is strikingly similar in all examinations made. Such lesions show a freckled, grayish-brown, hyperkeratotic surface with underlying, dry, vacuolated, horny, epithelial cells which have a predilection for the area surrounding and including the upper part of the sebaceous and pilo-sebaceous glands. There is a predisposition to proliferate downward with everted cone-like plugs. The granular layer, together with the upper corium, tends, as the disease progresses, to degenerate with destruction of the sharp contour of the basal cells. If the lesion continues to progress, it takes on inflammatory changes such as hypertrophy or degeneration of the upper and later the deeper connective tissue of the corium. After such advancing changes we then have a typical picture of an epithelioma.

Treatment.—Our treatment of superficial keratoses consists: (1) of the careful removal of all soluble sebum surrounding and incorporated within the keratosis, with a small pledget of gauze or cotton moistened with sulphuric ether. Repeated brushing of the lesion with the gauze first one way and then the other, or, if necessary, a gentle scraping of its edges with a small skin curette, should be successful in removing the horny accumulation. If not, it will reduce it to a minimum thickness, thereby rendering it more penetrable for the solution.

(2) With a small, tightly twisted cotton swab an application of a 20 per cent solution of salicylic acid in lysol is made. One thorough and cautious application of this solution may be sufficient, though it can be repeated for two or three days in succession. The first sensation following its application is a slight stinging burning, increasing for a few minutes, then slowly subsiding after a period of 30 or 40 minutes. The first appearance is that of a grayish-white cauterized patch which gradually changes in color, after several hours, to a yellowish-brown crust. This crust begins to exfoliate or shed about the third day, and by the fifth or sixth day it has entirely disappeared or can be easily removed, leaving only a scarless, soft, smooth, normal area. If any of the keratosis remains, the former technic should be repeated.

Salicylic acid has long been recognized as one of our most valuable keratolytic agents.

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*Read in Section on Dermatology and Syphilology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

Lysol is chosen as a vehicle because it is a feebly alkaline liquid compound, soap-like, made from oil of tar, fats and a strong alkali, probably sodium hydroxide. It unites rapidly with water, sebum and the alkaline accumulations of the keratoma. When salicylic acid and lysol are combined, we have a superficial penetrating cauterizing agent for the removal of keratoses which is convenient, ever ready, inexpensive, and effective. It has not some of the objectionable features that are to be found in most of the other agents, such as carbon dioxid snow, x-ray, radium, or electric cauterization.

Let me emphasize that this treatment is based upon a careful, clinical, differential diagnosis. If, after inspection and palpation of the lesion, there still remains a reasonable possibility that malignant changes have already begun, the condition should be treated with radium, x-ray, or surgery. Repeated applications of this solution might actually stimulate the growth of an early epithelioma.

CONCLUSIONS

We have found in our salicylic-lysol compound a convenient, inexpensive, almost painless, successful treatment for superficial keratoses which is not attended in any degree by embarrassing sequelae.

DISCUSSION (*Abstract*)

Dr. J. A. Elliott, Charlotte, N. C.—Any method of removing keratoses is good if the result is permanent. On the other hand, I do not believe in having a patient come to your office several times when you can accomplish the same thing in one treatment, and you can permanently get rid of these lesions by dissecting them with the electric needle. With even a small amount of experience there is no scarring produced and you do not run the risk of stimulating the epithelium.

Dr. Cosby Swanson, Atlanta, Ga.—In the superficial type of keratoses I use half-strength radium plaques, from ten to twenty minutes, using dental rubber dam as a filter. In about seven to ten days an erythema will appear which lasts from two to three weeks. In blondes, as a rule, after the erythema disappears the treated area has the same appearance as the surrounding skin. In brunettes there often is a slight depigmentation.

In the deeper seated type of keratoses it is necessary to use larger doses of radium, the lesions healing with slight atrophy due to this increase of dosage.

In the verruca type I usually desiccate.

Dr. J. N. Roussel, New Orleans, La.—Anybody who has ever used alkaline Fehling's solution for superficial and fairly well developed keratoses, where there has been considerable thickening, will not use anything else. The lesion should be carefully denuded of its epidermal layer with a sharp instrument (better made of wood) in the presence of the Fehling's solution, neutralized with liquid chlorid of iron.

This leaves a perfectly dry lesion, which heals in about a week, with no scarring or discoloration.

Dr. Jack W. Jones, Atlanta, Ga.—Has Dr. Lain had any experience in using his solution on those freckle-like spots on the hands of older men and women? I have found no good method of taking them off without scarring.

Dr. Earl D. Crutchfield, San Antonio, Texas.—The removal of keratoses comes in the last analysis to the workman who is familiar with his tools. One uses an alkali and the other an acid. Sherrell, years ago, instituted the treatment of epithelioma and keratoses with nitrate of mercury. In 1919 Dr. Lain told us about the use of salicylic acid in lysol. By this method you have to currette off the keratoses, or you do not get down to its base. Application of powdered aspirin after curretting helps.

We see beautiful results from three to six months after using x-rays. I am just about getting old enough to see some of the patients I treated ten or twelve years ago, and many of them, I am sorry to say, have little spots that they should not have.

It was in 1900 and 1902 that Pusey wrote his article on carbon dioxid snow. You can take those lesions off with that or any other destructive measure. You can take them off simply with mild dissection after you have become accustomed to your machine. I think Dr. Lain has a good agent for the treatment of superficial keratoses. I use a dram to the ounce and keep it on my table for immediate use. While all keratoses should not be treated with it, it is well worth knowing.

Dr. Lain (*closing*).—In the deeper or pre-cancerous lesions, we always prefer to use radium or the desiccation method.

One application is successful and permanent only in proportion to the depth of the lesion, or, better still, the care with which you have prepared the lesion before you put on the application. You should rub the skin back and forth with etherized gauze or cotton, after which the sebaceous matter which constitutes the body of the lesion will rapidly dissolve.

Ordinarily the strength of the solution is about 12.5 per cent, a dram of salicylic acid to an ounce of lysol. Sometimes we use a stronger solution, about a dram and a half, or a 20 per cent solution. When I am sure the lesion is not yet malignant and am not limited in time for the removal of the crust, I apply overnight a salicylic paste. The next morning only a gentle brushing with ether completely removes it. It is not necessary to cause the blood to show. Only remove the horny portion of the lesion.

The old formula to which Dr. Roussel referred suggested to me the one which I now use. I could see no need for using iron and other agents which the old Ravogli formula included.

I do not use this preparation for the removal of freckles. This solution is also a cure for certain types of ringworm in an individual who is not too sensitive to pain. One application is sufficient to exfoliate and many times cure. This has become a common treatment in our office for ringworm of the scalp, though it is quite painful for fifteen or twenty minutes.

MANAGEMENT OF GONORRHEAL ARTHRITIS*†

By J. ALBERT KEY, M.D.,
St. Louis, Mo.

I am bringing this subject to your attention because we have no standard method for the treatment of this rather frequent condition and because severe gonorrheal arthritis may be very troublesome to treat and may terminate in a result which is unsatisfactory both to the surgeon and to the patient. In this paper I shall give the methods which I use in handling these cases. None of the methods is original. I am not satisfied with the results which I have been able to obtain and I hope that the paper will be freely criticised.

As a rule, the diagnosis of gonorrheal arthritis is not difficult. A moderately acute arthritis in one or two large joints occurring in a patient with active gonorrhea may be assumed to be gonorrheal arthritis until it is proven to be something else. The onset in any given joint is usually abrupt, but there is often a prodromal period of a few days with pains in several joints. The knee, ankle, hip, wrist, and elbow are the joints most frequently involved. Any joint may be affected and the arthritis may be multiple, though, as a rule, one or two joints only are diseased. Moderate fever and leucocytosis are usually present, and the involved joint may be exquisitely tender and painful, presenting the picture of an acute arthritis, or the inflammation may be only moderate in degree. In most cases the diagnosis can be confirmed by aspiration and culture. We have grown Gram-negative cocci from thirteen of the last sixteen cases which we diagnosed as gonorrheal arthritis.

Having decided that we have to deal with a gonorrheal arthritis, what prognosis can we offer the patient and what can we do to make the patient more comfortable and to better his chance of obtaining a useful joint in the shortest possible time?

An acute gonorrheal arthritis may pursue one of the four following courses: (1) the inflammation may clear up entirely within a few days and a normal joint result; (2) the arthritis may remain fairly acute over a period of a few weeks, then gradually subside and leave a normal joint; (3) the arthritis may persist for several weeks or months and then very gradually quiet down and leave a joint with more or less limitation of motion and one which is subject to periods of pain during periods of inclement weather or after it has been subjected to some unusual strain; (4) or the disease may progress rapidly and result in bony ankylosis.

It is also to be remembered that other joints may be affected before the primary joint clears up.

Although I have studied many gonorrheal joints, I am not yet in a position to state which of the above courses will be pursued by any given case. It is my impression that joints which contain considerable excess fluid and are only moderately tender, and in which there is relatively little peri-articular thickening are the ones which offer a good prognosis and are apt to clear up spontaneously regardless of the treatment; while those which are acutely tender with considerable peri-articular thickening and relatively little excess fluid in the joint offer a bad prognosis and are apt to remain sore and painful for a long time and result in stiff or ankylosed joints regardless of the treatment.

In other words, gonorrheal arthritis is in many instances a self-limited disease, while in others the affected joint seems to be doomed regardless of any treatment which we can employ.

Before we take up the treatment it is in order to consider very briefly the pathology of the condition. It is similar to that of ordinary pyogenic arthritis except that the inflammation is less severe and the destruction is less rapid. The gonococci are present in the joint and in the tissues around the joint. The synovial exudate contains a variable number of leucocytes and macrophages and may contain clots of fibrin. The synovial membrane and subsynovial tissues are infiltrated with leucocytes and macrophages and there is more or less proliferation of the fixed connective tissue cells. The blood vessels are engorged and increased in size and number. The joint surface may be transformed into a pyogenic membrane, the exudate from the surface of which is poured into the joint cavity. In rare instances small extra-synovial abscesses may be formed by the breaking down of densely infiltrated areas. If the condition persists long enough the articular cartilage is destroyed, partly by the ingrowth of inflammatory tissue and partly by lysis by the leucocytic exudate.

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*Read in Section on Bone and Joint Surgery, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

†From the Department of Research of the Shriners' Hospital for Crippled Children and the Department of Surgery of Washington University.

We have, then, to treat a relatively low grade local infection in a given joint. This infection is of such a nature that many, perhaps half, of these joints will completely recover, but it may be so severe that the joint will be completely destroyed. However, the infection is never so virulent that the life of the patient will be endangered by sepsis and it is never so severe that abscesses form and rupture and leave persistent sinuses leading to bone, as may be the case in ordinary pyogenic arthritis. Consequently, any operative procedure undertaken by the surgeon is an elective procedure.

The treatment may be divided into general and local measures. The objects of the general treatment are to increase the resistance of the patient and to prevent reinfection of the joint or infection of other joints by removal of the primary focus. Adequate nutrition and rest with freedom from pain should be maintained, and as in any other infection I believe in forcing fluid and increasing elimination in these patients.

The primary infection is usually in the genitourinary tract and this should be treated vigorously by some one who is skilled in that branch of medicine. Attention to the primary focus is a definite part of the treatment of any gonorrheal joint.

In an effort to increase the resistance of the patient gonococcic vaccine is administered for a short period (about two weeks). If the patient does not seem to be making satisfactory progress foreign protein therapy either in the form of milk injection or purified casein is substituted for the vaccine, and if satisfactory reactions are not obtained typhoid vaccine is injected intravenously to produce the foreign protein reactions. Whether or not this form of treatment has any effect upon the condition I do not know, but as it does no harm one is almost obligated to use it.

Efforts have been made to attack the organisms by means of chemical antiseptics introduced into the blood stream. I have received glowing verbal reports of the almost miraculous cures obtained by the intravenous use of mercurochrome. I have used it in only one case and in that case there was no demonstrable change in the affected joint. However, mercurochrome is deserving of further trial in gonorrheal arthritis by those who are not afraid to use it intravenously.

Amidoxyl has also been recommended as a cure for gonorrheal arthritis. I have used it in only two cases. Both of these patients recovered with normal joints and both believed that their recovery was due to the intravenous injections of amidoxyl. However, both patients had the mild type of joints which usually get well under any form of treatment. I believe that amidoxyl should be given further trial in gonorrheal arthritis. My opinion of this drug will be set forth in more detail in a paper on its use in the treatment of chronic arthritis which is now in preparation.

Local treatment has for its objects relief of pain, prevention of deformity, preservation of motion and elimination of the local infection. It is because of his skill in the local treatment of joints that the orthopedic surgeon is asked to treat these patients.

Relief of pain is accomplished by immobilization of the affected joint, and this is most efficiently obtained by a plaster cast which can be bivalved in order that physiotherapeutic measures may be employed. The joint may be immobilized by splints or by traction, but in most cases a plaster cast will be more satisfactory.

Prevention of deformity is a part of the treatment which is sometimes neglected, but it should be considered from the very beginning. It should be emphasized that every gonorrheal joint is potentially an ankylosed joint and that when such a joint becomes ankylosed in a position of deformity it is nothing less than a surgical catastrophe. For this reason when the cast is applied for the relief of pain the joint should be immobilized in the position of choice for the given joint for that particular patient and, if necessary, an anesthetic should be administered and the joint manipulated into the optimum functional position before the cast is applied.

Preservation of the normal range of motion can be obtained only by the fairly prompt cure of the local infection as more or less motion will always be lost if the infection persists over a long period of time, and normal motion will always be regained if the local infection clears up promptly. For this reason it is my practice to ignore the question of motion while the infection is acute and to immobilize the joint simply for comfort. Certain exceptions to this rule will be mentioned later.

Local heat applied in the form of baking or diathermy is often used in these cases and affords some comfort to the patient, but I have not been able to convince myself that it has

any effect upon the course of the disease. The same is true of gentle massage and of Bier's hyperemia.

We next come to the question of active surgical intervention. For some years it has been my practice to open acute gonorrheal knee joints and to wash them out thoroughly with a hot (115°) solution of normal saline or 1-15000 bichlorid of mercury. At least a gallon of the solution is used and the irrigation is continued for at least fifteen minutes, the joint being alternately flexed and extended so that all parts of it are reached. The wound is then sutured in layers and a plaster cast is applied. At the end of about ten days the cast is bivalved and the patient is permitted to begin moving the knee. I have never had a stiff knee follow this plan of treatment, but I have used it only on comparatively early cases. I prefer arthrotomy to irrigation with a large needle or trochar because it enables one to explore the joint and to remove any clots or fibrin which may be present.

Extra-articular abscesses are very rare. They usually heal promptly after incision and drainage, and may heal promptly after aspiration.

In joints in which the disease is more advanced with beginning destruction of the cartilage I have performed the arthrotomy and irrigation as described above and have then left the joint open and practiced Willems' method of active mobilization, having the patient put the affected joint through the full range of relatively painless motion every two hours, night and day. As in ordinary pyogenic joints, it is surprising to see the range of motion increase and the pain diminish. As the discharge ceases the operative wound gradually heals. By this method I believe that I have saved some motion in several knees and one elbow which were apparently doomed to complete ankylosis.

In the past I have opened only knees and elbows, but I believe that I shall soon begin to open other joints and either wash them out and close them or leave them open and practice Willems' treatment, depending upon the condition found at operation.

As the local infection subsides most gonorrheal joints are stiff and painful. Local heat in the form of baking or hot soaks and active and passive motion and massage are used to hasten the return to normal function.

Old gonorrheal joints in which there is fibrous ankylosis in a position of deformity with a very limited range of motion should be manipulated under an anesthetic and the joint immobilized in the position of choice for optimum function. I am not in favor of manipulating such joints in an effort to regain motion, as the ankylosis usually recurs, and if one tries to preserve motion the deformity is apt to develop again. It is also to be remembered that the manipulation may cause the infection in the joint to become active again.

If the patient is very anxious to obtain motion in the joint, and if the surgeon is capable of performing the operation and carrying out the after-treatment correctly, I advise an arthroplasty, but the operation should not be performed until the joint infection has been inactive for a year or more.

In joints with bony ankylosis an arthroplasty is the operation of choice, but under the same limitations as were noted above. If there is bony ankylosis with deformity, the deformity can be corrected by an osteotomy and a useful limb obtained. It is to be pointed out, however, that old gonorrheal joints are among the most favorable subjects for arthroplasties and the patient should be given the opportunity of choosing such an operation if he is very anxious to regain motion in the joint.

DISCUSSION (*Abstract*)

Dr. Robert W. Johnson, Baltimore, Md.—All of us have certain pet ideas and pet hunches about the treatment of gonorrheal arthritis. The paper presented by Doctor Key about represents my own views as to treatment.

Dr. E. S. Hatch, New Orleans, La.—These cases fall under two heads: the mild type of gonorrheal joint in which there is never any local pus formation and which clears up under almost any one of the ordinary local treatments plus the treatment of the urethritis. In the other more severe type of case the joints have a pure culture of gonorrheal pus in them almost from the start, and in this type we should make a plea for immediate operation.

The great trouble, I think, is with the general practitioner who sees these cases and does not realize just what is happening in the joint. When we are asked to see them three or four weeks after the initial attack of joint trouble, there is marked swelling, some deformity, and great pain which has lasted during practically the whole of this period. At this stage the patient has much less chance for a good functional joint, whatever the procedure undertaken. If the patients are seen early, when the pus has been present for only a few days, and the joint is opened on both sides, washed out freely with hot water and sewed tight in layers, they recover with practically normal motion. If, however, we do not see them in this stage, but several weeks after the initial joint invasion, I like to operate upon the joints, wash them out and sew them up by

the Willems' method. This procedure works extremely well in cases where it is impossible to sew them up tightly, and many recover with from 75 to 80 per cent normal range of motion.

Dr. Key (closing).—This is a common type of arthritis, and the number is not apt to grow less. I am very much dissatisfied with what I know about handling these joints.

PYELITIS COMPLICATING PREGNANCY*

By WARREN E. MASSEY, B.S., M.D.,
Dallas, Texas.

Of all complications of pregnancy, pyelitis is probably the most dangerous, for we cannot over estimate the far reaching effects of a diseased kidney and urinary tract.

An obstetrician should be as capable of preventing, detecting and treating the condition of pyelitis as is an urologist. He must be as keen a diagnostician, and no less alert to the causes and symptoms of this disease

Following the first visit of a patient, the physician should review the history and findings, and ask himself these questions:

(1) Is this patient, because of her present condition, more susceptible to infections of the urinary tract?

(2) Does the state of pregnancy actually invite an infection into the urinary tract?

(3) Has this patient had pyelitis or any urinary disturbance at any time in her life?

(4) Has she any foci of infection from which bacteria may invade and infect the urinary tract?

(5) Is the urinary tract free from any abnormal state?

These five questions are practical and of importance alike to the specialist in obstetrics and to the general practitioner.

Certain authors have again this year raised the question of immunity in pregnancy. If the opsonic index is lowered, and, thereby, the general resistance decreased, we may readily assume that the patient is susceptible to infections in the kidneys. Hofbauer, in the *Bulletin of the Johns Hopkins Hospital,* says,

"Lately Sano has published results from a large number of experiments which show clearly that during the second half of pregnancy there occurs a marked lowering of resistance on the part of the organism against infection."

In pregnancy, and, particularly, during the first half, there is an increase, first, in the number of muscle and connective tissue fibers of the uterus, and, second, in the size of the fibers. Similar changes occur in the lower urinary tract around the ureter and in the trigone of the bladder. For this reason the lumen of the ureter is decreased and its course somewhat changed. Urinary stasis follows. There is not a more cordial invitation to the development of infection in the kidney pelvis than urinary stasis in that region.

The third question, "Has this patient had pyelitis or any urinary complication at any time in her life?" depends for answer upon a carefully obtained history. If it is possible that partial strictures of the ureter may have remained unnoticed since childhood, then it is more important to know whether the patient had any kidney infection as a child or any symptoms which remotely indicated a kidney infection. Frequently pyelitis of childhood is diagnosed as typhoid or malaria fever. Detailed questioning will often reveal the differential diagnosis. Many times only one symptom of pyelitis will be remembered. These details are very likely to escape detection.

Whether or not pyelitis is caused at any time by bacteria from other parts of the body, it is well to remember that there is a possibility of danger in any focus of infection. Perhaps the tonsils, teeth, sinuses, ears and other points of infection may liberate bacteria which cause pyelitis. The obstetrician too often overlooks these possibilities.

The fifth question, "Is the urinary tract free from any abnormal state, particularly pyelitis?" to be answered must be determined by the early symptoms of pyelitis, and very often these symptoms are so obscure that we may miss them even with moderate care. Let us consider these symptoms,

(1) General malaise.
(2) Temperature.
(3) Frequency.
(4) Burning sensation on voiding.
(5) Pain and its course of radiation.
(6) The complete findings of a catheterized specimen.

Many times a patient complains of sluggishness, dizziness, weakness, a sort of general "achy" and no-account feeling. We are prone to think of constipation, over-eating and lack of exercise as the cause for this condition when it is the aggregate beginning of the several typical symptoms of pyelitis.

Every patient should be instructed to report her temperature when she is not feeling well.

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*Read in Section on Obstetrics, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

The physician should take the patient's temperature at each office visit. Just as surely as there is an infection in the kidney, the formation of pus follows. The reaction is accompanied by an over-normal temperature, even though it be a very slight rise. My attention with respect to pyelitis was first called to a case developing post-partum. The temperature was, first day, 99° F.; second day, 99.6° F.; third day, 100.4° F.; fourth day, chill, temperature of 103° F. A catheterized specimen of urine contained numerous pus cells. Then, and then only, did I examine the patient closely enough to ascertain the beginning of other symptoms. Why should pyelitis not have been suspected with the temperature of 99° F.? We must also remember that fever may be present when no pus cells are found in the specimen which the patient brings to us. Some other diseases, either of a general nature, as, tuberculosis, or, of a local nature, as, a more localized focal infection, may be the cause of this temperature. Fever is a sign that should cause us to stop and search for the cause.

Frequency of urination may be accompanied by a burning sensation, or either symptom may exist separately. In all cases of pyelitis in which I have found these symptoms, the urine has been acid in reaction. Frequency and burning sensations may be the result of inflammation of the urinary tract at points other than the pelvis of the kidney. However, these symptoms are so constantly associated with pyelitis that the condition should always be suspected when they are present.

Pain in the lumbar and thoracic regions over the kidney is always suggestive even to the laity of kidney infections. Many times the pain assumes the form of a continuous backache very early. Certainly, when it becomes acute, sharp and radiates to a groin and down a thigh, we speak of it as a typical symptom of pyelitis. We should detect the condition before this symptom has become pronounced.

Throughout the period of pregnancy a voided specimen of urine should be examined every two weeks. If blood or pus cells are found, examine a catheterized specimen and begin treatment. A catheterized specimen should be examined at the first or second visit for two reasons: first, as a matter of accurate record, and, second, in order that any abnormal constituent of the urine may be detected early without the possibility of contamination from vaginal secretions.

The treatment should be as follows:

(1) Treat the patient symptomatically in order to make her comfortable.

(2) Alternate the reaction of the urine.

(3) Employ drainage and lavage of the kidney pelvis with antiseptics.

The general comfort of the patient may require confinement in bed, especially if fever and pain are present. Many times elevating the foot of the bed aids in relieving the pain in the back. Sedatives, anti-pyretics and even narcotics are necessary for relief of pain.

If the reaction of the urine is acid, urotropin with or without acid sodium phosphate, each 15 grains, should be given every four hours for a period of three days, and then discontinued. Immediately the urine should be made alkaline by the use of citro-carbonate drachms two in a half glass of water every four hours. In some cases this alternating at periods of three, four or five days will suffice to control, and, many times, eliminate the disease.

Should the case not respond, or, become acute and produce rigors with extreme pain, drainage of the kidney pelvis by means of catheterization is necessary. I am of the opinion that the cystoscope will become a useful and valuable instrument in obstetrics. The physician and obstetrician should be cognizant of indications for its use and skilled in its application. One catheterization and drainage of the pelvis followed by instillation of 40 per cent neo-silvol has proven sufficient in several cases. There is no reason why an obstetrician should not treat his patient thus as often as is necessary. I should like to present two case reports as follows:

Case 1.—Mrs. K. J. B., age 32, multipara, was seen in consultation at the sixth month of her third pregnancy. At this time, she complained of (1) pain in the region of both kidneys, (2) frequent and painful micturition, (3) blood in the urine, (4) rigors. This condition was of twelve days standing. It had been sudden in onset, and had not responded to large doses of urotropin.

Upon physical examination, the positive findings were: (1) temperature, 105° F.; pulse, 120; respiration, 32. (2) There was no evidence of an acute infection in head, neck and chest. The abdomen was somewhat distended and very tender on pressure. Slight pressure in the lumbar region and lower thoracic region posteriorly causes extreme pain. The blood count was: hemoglobin, 50 per cent; red cells, 2,500,000; white cells, 10,000; with a differential of 74 per cent polymorphonuclears; 24 per cent small lymphocytes and 2 per cent large lymphocytes. An analysis of a catheterized specimen of urine revealed a specific gravity of 1.007, neutral reaction, trace of albumin, many pus cells, many clumps of pus cells and few red cells. The Wassermann was negative. The blood pressure was 120 systolic, 80 diastolic.

Upon cystoscope: (1) the urethra was red, swollen, very sensitive. Cystoscope passed without difficulty.

(2) The bladder wall appeared normal except for the ureteral orifices, which were inflamed. The kidney was catheterized without difficulty with a No. 5 catheter. The same size catheter could be passed in the left ureter only about two-thirds the distance that the right one was passed. Specimens were collected, and the urine allowed to drain for several minutes. A culture of the specimens revealed a colon bacillus infection. A pyelogram was made, using 40 per cent neo-silvol. The right kidney was injected with 25 c. c., and the left with 21 c. c. before pain was noticed. The neo-silvol could not be withdrawn through the catheters, so they were removed. Two days later the catheters were again inserted and left to drain for twenty-four hours, then removed. The patient began to improve. She was kept in bed and given a general diet. Two drachms of citro-carbonate were given every four hours. Large quantities of fluids were also given. At the end of five days she was free from temperature and pain. She went home and continued the use of citro-carbonate, alternating with urotropin and acid sodium-phosphate at intervals of one week. To date, she has not been delivered. Although the urine is not sterile, she has had no recurrence of pain or of rigors.

Case 2.—Mrs. T. L. M., age 17, primipara, when first seen was six months pregnant.

The patient entered the hospital after a long automobile trip with diagnosis of appendicitis. She complained of pain in the lower right quadrant of the abdomen, and of a burning sensation on urination, also of a soreness in the lumbar region. The condition was of two days standing.

Upon physical examination we found: temperature, 99.4° F.; pulse, 100; respiration, 24; blood pressure, 120 systolic, 80 diastolic. She was free from any abnormal condition of the head, neck and thorax. The abdomen was distended by a moderate amount of gas and by a uterus at six months. There was a slight soreness in the lower right quadrant of the abdomen, but no muscular rigidity. Fist percussion over the lower thoracic and upper lumbar region of the back caused extreme pain. No other positive symptoms could be elicited.

Analysis of a catheterized specimen of urine showed: specific gravity, 1.011; reaction, acid; trace of albumin; many pus cells; no blood cells.

The blood count was: hemoglobin, 50 per cent; red cells, 2,440,000 per cu. mm.; white cells, 12,600, with a differential count of 77 per cent polymorphonuclears, 19 per cent small lymphocytes, 2 per cent large lymphocytes, 1 per cent mononuclear leucocytes and 1 per cent transitional cells.

A diagnosis of pyelitis and possibly appendicitis was made.

Treatment.—(1) The patient was kept in bed with the foot of the bed elevated six inches. An ice cap was kept on the lower part of the abdomen. Morphin, grains 1/8, hypodermatically, was given for pain.

(2) On the following day the kidneys were catheterized. The external meatus of the urethra was red and swollen. The bladder was normal. The orifices were swollen. Slight pain was produced when the ureteral catheters were inserted, and they were passed with difficulty. Thirty-eight c. c. of urine were withdrawn from the right kidney, and 10 c. c. from the left kidney. The patient said that her back was then less painful. A pyelogram was made by injecting 40 per cent neo-silvol into the pelvis. The cultures of the kidney specimens revealed *Staphylococcus aureus* infection.

After cystoscopy, the patient was kept in bed. A general diet was given, with large quantities of fluid. Two drachms of citro-carbonate in water were given every four hours for three days and followed by urotropin with acid sodium phosphate gr. 15 every four hours. After seven days she was free from pain, soreness and fever. She was discharged. At home, she went to full term, and was delivered without return of an acute attack of pyelitis.

CONCLUSIONS

(1) Pregnancy predisposes the body to an infection of the urinary tract, particularly pyelitis.

(2) Pregnancy is frequently the cause of a recurrence of pyelitis.

(3) A diagnosis of pyelitis should be made upon an early recognition of the symptoms.

(4) Pyelitis will become more infrequently a complication of pregnancy as the obstetrician becomes more skilled in all of the means of treatment.

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DISCUSSION (*Abstract*)

Dr. W. R. Cooke, Galveston, Texas.—Many cases of pyelitis could be prevented with proper prenatal care. In most of the others, if they were recognized and treated early, relief of the condition would be easier and there would be less damage to the kidneys than in the advanced case. As to the exact mechanics of the situation, we may say that there is definite evidence at present that in almost every pregnant woman a certain amount of urinary stasis with general lowering of resistance to infection exists.

In our practice we depend largely at the outset on the forced intake of water, and on hexamethylenamine with sodium benzoate. Sodium benzoate is an excellent bacteriostat from the moment of its passage through the epithelium of the kidney, and this permits the urine to regain its normal acidity. We have found sodium acid prosphate quite irritating in some cases, and therefore use it only when the sodium benzoate fails to bring about an acid reaction.

The cystoscope has revolutionized the whole treatment of the pyelitis of pregnancy. This condition used to be considered one of the gravest of complications; but now we hardly consider it at all in that light. We catheterize these patients quite early, as Dr. Massey has indicated. If the temperature does not subside under medical treatment within 24 to 48 hours, we catheterize the ureters, because we think the sooner we do

this, the less damage there will be to the kidneys. In 1915, I wrote a paper in which I said that the cystoscope should be as familiar to anyone who treats the urinary tract as the stethoscope is the practitioner. The technic of ordinary cystoscopy is simple; the instrument is not expensive; and many patients with early stages of urinary tract disease will be cured through the use of the cystoscope, with a minimum of damage. We have found the effect of catheterizing the ureters lies in the drainage obtained; and the results, as far as we are able to judge, are more due to the establishment of drainage than to lavage with any form of antiseptic. It is certainly much safer simply to drain the ureters than to attempt to force antiseptics into the pelvis of the kidney.

We have found the indwelling catheter extremely valuable. We pass a No. 5 French, and then a No. 7 with the No. 5 tip in order to obtain freer drainage. If the patient does not respond to this treatment, or if the pus is extremely thick, we leave a No. 7, or even a No. 9, in place for as long as is necessary. We have had a number of cases in which the period of retention of the catheter ran from fifteen to twenty-three days. In cases with extremely thick pus, we irrigate the pelvis with boric acid solution, through a No. 3 catheter passed inside the large indwelling catheter. Our first case of this sort was in 1915; the catheter remaining in place nineteen days in one case and twenty-three days in another, and at the time of delivery the urine was pus free and culture negative and the patient has had no recurrence in subsequent pregnancies.

There is one point which requires consideration: do not catheterize the ureters if streptococcic infection is present. This type of infection spreads through the lymph stream and not over the serous surfaces; so that really it cannot be drained to the surface from the lymphatics of the pelvis, and the trauma of catheterization may lead to increased invasion of the deep tissues by the infection, and thence to a general infection.

Dr. Benjamin H. Priborsky, Detroit, Mich.—Nothing has been mentioned as to prophylaxis. When I have a patient with suspected pyelitis I go into the history, and practically everyone gives a history of constipation and the use of violent cathartics. I insist that under no circumstances shall the patient use a violent cathartic such as castor oil. The cathartic should be mild, for example, milk of magnesia.

Dr. Gilbert F. Douglas, Birmingham, Ala.—For the first ten days after delivery, regardless of whether it is the first patient the physician has delivered or the twenty-first thousandth, there is a certain feeling of uneasiness if the patient develops a temperature which persists for several days. The investigation of kidney conditions in these cases and the diagnosis of pyelitis has relieved us of many restless nights, and in addition relieved the patient very materially.

Every gynecologist and obstetrician should be able either to do cystoscopic work or he should surround himself with those whom he can call on at almost any time. If we investigate the urinary tract thoroughly, even if there are no symptoms at all, we shall save ourselves trouble many times and our patients will be much more comfortable.

Dr. W. B. Anderson, Nashville, Tenn.—Mild cases of pyelitis are much more common than is generally believed. Most of them and many of the severer types can be carried through pregnancy with an abundance of water and some urotropin if you want it, though I place little confidence in urotropin. The amount of water must be specified and you must have the cooperation of the patient. Cystoscopy is not so easy and painless as some of you seem to think. A few women do not complain seriously of the pain. It should be done by a specialist. Pyelitis becomes a serious problem when it causes chills, high fever and soreness. Then it becomes necessary to cystoscope and drain the affected kidney. I believe that every case of pyelitis is a pyelitis in pregnancy and not a pyelitis of pregnancy. The pyelitis or the cause that produced it was there before the woman became pregnant.

Dr. Massey (closing).—The object of this paper is not to emphasize the treatment so much as to emphasize the diagnosis of the symptoms in their very beginning. If we become proficient enough to recognize the symptoms in the beginning, we shall probably be able by common medical procedures to avert any serious complication.

IN HYSTERECTOMY FOR BENIGN DISEASE SHOULD THE CERVIX ALWAYS BE REMOVED?*

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This paper is the outgrowth of a desire to determine, if possible, the tenability of a position taken some years ago with reference to removal of the cervix uteri in hysterectomy for benign disease. It is based on statistics of Charity Hospital, at New Orleans, for five years: 1919, 1920, 1921, 1926, and 1927.

During an acute agitation of this question in 1919 we adopted the following rules for guidance in hysterectomy for conditions other than malignancy: (1) when the cervix is badly lacerated or diseased it is to be removed in all cases; (2) when the cervix is approximately normal, but easily accessible it is to be removed; (3) when the cervix is approximately normal, but very inaccessible, it is not to be removed.

During the past several years there have appeared, at not infrequent intervals, articles urging on the one hand routine removal of the cervix, and on the other routine supra-vaginal amputation, the latter articles recommending repair or cauterization of the cervix before or after removal of the uterus. Statistics on the occurrence of carcinoma in the remaining cervix, on the primary mortality for both operations, and on the morbidity following these operations vary greatly in different clinics. It was accordingly decided to study the results in the years imme-

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*Read in Section on Gynecology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

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diately following the acute agitation in favor of the radical operation and also in two years further removed from this time, with the hope of adding something definite to the unsettled question. Let it be said at the outset that this hope was shattered by finding the statistics on the occurrence of carcinoma in the residual cervix absolutely useless. There is no way to determine from the records whether or not a case of cervical carcinoma had previously had a supra-vaginal hysterectomy. Hence the incidence of carcinoma in the remaining cervix is taken from reports from other large clinics.

Most patients upon whom hysterectomy for benign disease is done at Charity Hospital are negresses, who come in for operation only when driven to do so by advanced disease, usually large fibroids or pelvic inflammatory disease with extensive destruction of the pelvic organs. Furthermore, Charity Hospital at New Orleans is essentially a training school for medical students, interns, and recent graduates. It is natural, therefore, that many of these cases are operated upon by men of less experience than those working in some of the other large clinics. These explanations are offered to lessen the startling effect of the mortality rates to be submitted.

In 1919, there were 127 pan-hysterectomy operations for other than malignancy, with fifteen deaths, or 11.81 per cent. In the same year there were 130 supra-vaginal operations with eleven deaths, or 8.46 per cent. It will be noticed that the mortality in this year was exceedingly high for both operations, but there was more than 3 per cent in favor of the less radical procedure. Furthermore, whether because of the acute agitation in favor of the radical operation at that time or through coincidence, there were only three less radical operations than supra-vaginal.

In 1920, there were 125 pan-hysterectomies with nine deaths, a percentage of 7.2, and 174 supra-vaginal operations with thirteen deaths, or 7.47 per cent. In this year the percentage of mortality was slightly in favor of the radical operation. However, the total number of pan-hysterectomies was much smaller than the total number of less radical operations, probably because the agitation for the radical procedure had somewhat subsided. It seems logical to infer that the cases for radical operation were probably more carefully chosen, with a marked actual and comparative improvement in the death rate.

In 1921, there were 90 radical operations with eleven deaths, a mortality rate of 12.22 per cent, and 158 supra-vaginal hysterectomies with eight deaths, a percentage of 5.06. In spite of a diminished ratio of radical to less radical procedures, the death rate mounted enormously, being over 7 per cent higher. Analysis of these cases failed to reveal any general cause of this startling, almost unbelievable death rate, which occurred despite an apparent more careful choosing of cases.

In 1926, there were 58 pan-hysterectomies and three deaths, a percentage of 5.16, and 272 supra-vaginal operations and 16 deaths, a percentage of 5.88. Here, again, the rate is slightly in favor of the radical operation. It must be noted again that the ratio of radical to conservative operation was further reduced, indicating still more careful choosing of cases and subsidence of the local agitation for pan-hysterectomy.

Finally, in 1927, there were 54 complete operations with three deaths, or 5.55 per cent, and 246 supra-vaginal amputations with 13 deaths, or 5.28 per cent. The ratio here remains small, with the mortality rate slightly in favor of the less radical operation.

It will be noted that the ratio of radical to conservative operation grew steadily smaller, and that the death rate for the two procedures grew much closer together in the latter two years, where the ratio was smallest.

In the five years under consideration there was a total of 454 complete operations with 41 deaths, or 9.03 per cent, and 980 supra-vaginal amputations with 61 deaths, a percentage of 6.22. If we add to this latter figure the 2 per cent usually given for the incidence of carcinoma in the remaining cervix we still have a percentage of 0.81 in favor of supra-vaginal hysterectomy. However, considering only 1926 and 1927, the two years in which the small number of radical operations as compared to conservative removal was performed, the added incidence of carcinoma gives a mortality advantage of almost 2 per cent to the radical operation.

From the five-year mortality rates one might reach the conclusion arrived at by Maurice Kahn in an editorial in *Surgery, Gynecology and*

Obstetrics for April, 1927: that complete operation performed by the average operator probably does not reduce the total number of deaths from hysterectomy. The figures for 1926 and 1927 suggest that careful choosing of cases for pan-hysterectomy makes this operation no more dangerous primarily than conservative operation.

It is doubtful that the compromise of reaming out or cauterizing the cervix from above has much advantage in the prevention of carcinoma, since, according to R. Peterson, only one-third of cervical cancers begin in the cervical canal.

Some advantages claimed for the supra-vaginal operation are: (1) lower primary mortality; (2) no vaginal shortening; (3) less likelihood of prolapse of vaginal walls; (4) less chance of injury to ureter, bladder or rectum; (5) less danger of infection in pelvic structures because the vagina is not cut across; (6) less time required for the operation; (7) less chance for operative and post-operative hemorrhage; and (8) the lubricating effect of the cervical glands is not destroyed.

Some advantages claimed for the radical operation are: (1) the primary mortality is only slightly higher; (2) it avoids carcinoma incidence in the remaining cervix; (3) the morbidity is less because of removal of the cervix; (4) there is no vaginal shortening when the operation is properly performed; (5) there is no greater danger of infection if the vagina is properly prepared before operation; (6) operation requires no more time and no more risk of hemorrhage.

It is difficult to subscribe to all the advantages claimed for pan-hysterectomy. It undoubtedly requires more time to perform, offers more opportunity for injury to bladder, ureter, or bowel, and has a higher percentage of post-operative bleeding. These accidents are, of course, much more likely to occur in the very obese patient, with consequent deep and inaccessible pelvis.

Granted that the immediate mortality in the hands of the expert is but little higher for total than sub-total operation, and that the carcinoma incidence in the remaining cervix is about 2 per cent, giving pan-hysterectomy a slight ultimate advantage, there is yet another consideration. The patient who has successful supra-vaginal operation done and who ultimately dies of cancer of the cervix has had an interval of restored health and usefulness, a very considerable factor. And, less important but still considerable, it is far better for cancer to be charged with a death than to have a fatal ending charged to a surgical procedure, provided no injustice has been done the patient. We should guard our art only less carefully than we protect the welfare of our patients.

The evidence at hand seems to justify the conclusion that pan-hysterectomy by the average operator carries a decidedly higher primary mortality than the less radical operation, but that subsequent carcinoma of the remaining cervix brings the ultimate death rate of supra-vaginal hysterectomies but slightly below that of pan-hysterectomy. This carcinoma incidence might be considerably reduced by leaving in only healthy cervices, or by repairing and treating a diseased cervix either before or after operation. There seems no reason at this time to modify the position held since 1919 in favor of pan-hysterectomy; on the contrary, our original position seems quite tenable, with, perhaps, some modification in favor of supra-vaginal hysterectomy whenever the cervix is found inaccessible, the lacerated or eroded cervix to be treated before or after operation, or to be subsequently removed from below. The modified position might be stated as follows: in hysterectomy for benign disease the cervix should be routinely removed if it is found easily accessible (proper pre-operative preparation of the vagina is essential). When technical difficulties make the cervix very inaccessible supra-vaginal amputation is to be done, a lacerated or diseased cervix to be treated later, or, rarely, to be subsequently removed from below.

If in the final analysis about the same number of deaths are to occur on the one hand from radical hysterectomy and on the other hand from supra-vaginal hysterectomy plus carcinoma in the remaining cervix, it seems wise to prefer that these deaths occur from supra-vaginal hysterectomy and late carcinoma, since the patient will have had an interval of health and usefulness and the surgical art will have been spared the onus of the fatal termination.

The conclusion has been reached that the average operator should incline rather to supra-vaginal than pan-hysterectomy for benign disease, choosing his cases for the radical operation most carefully with reference to the tech-

nical difficulties and character of the surgical risk his patient presents. It is better to leave a cervix for future treatment or possible carcinoma incidence than to raise the primary mortality rate of hysterectomy for benign disease by insisting on routine radical operation.

DISCUSSION (*Abstract*)

Dr. Gilbert F. Douglas, Birmingham, Ala.—The initial mortality from the operation and delayed mortality as result of leaving infected or potential cancerous tissue behind, make this problem difficult. If we have a perfectly normal cervix without any sign of infection, it is better to do a supra-vaginal hysterectomy but in the presence of infection if we can remove the cervix without any great amount of disturbance to the adjacent tissue it is safer to do so.

If the patient feels that the cervix has been removed and all chances of recurrence have been eliminated she is much happier. A chronic infection left in the cervix is cause for morbidity in the future just like that from infected tonsils, teeth or other foci. We have all seen arithritis or other symptoms from these infections.

Every man can feel his limitations when he attempts a radical or total hysterectomy. Certainly there is greater danger of injury to the ureters or bladder in doing the total than there is in doing the supra-vaginal.

Dr. Robert Thrift Ferguson, Charlotte, N. C.—I am a strong believer in conservatism in all pelvic operations. I have yet to remove my first normal cervix. In preserving the cervix we are preserving the woman's pelvic support. In doing a supra-vaginal hysterectomy the morbidity and mortality are both greatly reduced and I do not believe that a pan-hysterectomy should be done in any case unless the condition of the cervix calls for the radical operation. To preserve the pelvic support in a woman is one of the greatest ends we can accomplish where pelvic operations are necessary.

Dr. John Wm. Neely, Terrell, Tex.—Hysterectomy in the hands of a majority of surgeons takes two hours, and that is a long time to keep the patient under an anesthetic. Many patients are better off if the cervix is left in. It is usually safe to leave a normal looking cervix in the younger woman. If the patient is older or the condition in doubt, a section of the tissue should be made at the time of operation. The cervix that is lacerated and giving trouble should be removed.

Dr. Kostmayer (closing).—I undertook this study to learn whether or not we should continue to practice conservatism when the cervix was good and take out the cervix when it was diseased. We have come to the conclusion that even in this we were a little too radical and I have a definite feeling that I would rather err in leaving a cervix in than do a pan-hysterectomy for the relief of benign disease with the loss of a patient who might have survived a less radical procedure.

SIMILARITY OF SIGNS AND SYMPTOMS OF SPHENOIDITIS TO INTRACRANIAL LESIONS AND THEIR DIFFERENTIAL DIAGNOSIS*

By WILLIAM A. WAGNER, M.D.,
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This subject is presented, first, to stimulate our minds in the direction of adjacent structures within the cranium, for our special senses are not only closely related to, but are a part of them; second, to stress the necessity to the oto-laryngologist of having some knowledge of the brain and its diseases which have been somewhat neglected; and, third, to impress the neurologist with the symptoms of sphenoiditis.

On account of the difficulties of diagnosis of sphenoidal infection, and the similarity of the numerous signs and symptoms of this affection to those of intracranial lesions, one readily recognizes the intricacy of such a subject as its differential diagnosis.[4]

In some patients with intracranial lesions, particularly some tumors of the brain, diagnosis is not difficult, but in all others the early symptoms may be confused with the symptoms of other diseases. Since headache, dizziness, tinnitus, vomiting, mental and psychic phenomena are the predominating early symptoms, they must be recognized as important factors in any attempt to make an early diagnosis.[20] It is these cases of early intracranial lesions with the beforementioned symptoms that simulate sphenoiditis, which in the majority of cases visit the oto-laryngologist, and in such cases the differential diagnosis from sphenoiditis is highly important. Oto-laryngologists see many of these patients at an early period for the relief of headache and other disturbances. Hence, it is important for the oto-laryngologist to be familiar with the early characteristics of intracranial lesions.[16]

In many instances very little emphasis is placed on the clinical picture presented by patients suffering with sphenoiditis or intracranial lesions and too little time is devoted to the oto-laryngological study. Patients suffering with these affections show numerous, perplexing and variable signs and symptoms; and since they involve the realm of neurology, they are usually

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*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

referred to the neurologist for diagnosis. He in many instances overlooks the possibility of sphenoiditis because of his lack of familiarity with the symptomatology of the disease.

When the condition is due to early intracranial lesions, the diagnosis may be overlooked because of an incomplete oto-rhinologic examination. The early cardinal phenomena of intracranial tumors are (1) headache, (2) vomiting, (3) choked disc, and (4) choked labyrinth, which usually occur before the focal or localizing signs and symptoms.[11] These four phenomena are usually due to the increased intracranial pressure which occurs early in the disease. Two of the phenomena, headache and vomiting, are symptoms, whereas the latter two, choked disc and choked labyrinth, are signs. Of the two, choked labyrinth is by far the most neglected and most frequently overlooked, and of some importance in differentiating sphenoidal lesions. It is usually not detected because of an incomplete otologic examination, or not until several months later when choked disc or one or more of the focal symptoms or signs develop.

The diagnostic investigation of cases suggestive of intracranial or sphenoidal disease is a matter of painstaking care and thoroughness. The subjective side of the problem, with the unreliability of the patient's response, adds to the difficulty and calls for keenness of judgment and careful study by a systematic and frequently prolonged or often repeated examination which many of us fail to make.[8]

Sphenoiditis.—The various symptoms associated with sphenoiditis are subjective, objective, general and ocular manifestations which vary from headaches to the peculiar symptom complexes, some of which are seemingly unattached to the sphenoid. The symptoms are dependent upon the type of sphenoiditis and the degree of extension of the pathological process. Of the different types, the hyperplastic type is the most variable.[17] The opinion is rather prevalent among oto-laryngologists that many of these patients come to them previously diagnosed as neurasthenics.

The subjective symptoms are: headache, from irritation of the sphenopalatine ganglion resulting in the "front-half" type of headache in which the pains are typically sensory along the distribution of the fifth cranial nerve, and the "backhalf" type, myalgic with the myalgic nodes, vasomotor in origin along the distribution of the seventh, associated with the Vidian and Sluder syndromes.[2 21] Ear symptoms are: vertigo, tinnitus, fullness, et cetera. Nasal symptoms are: frequent coryza; post-nasal discharge, occasionally with scab formations and constant hawking often associated with hoarseness or aphonia; anosmia or paranosmia; a feeling of fullness or heaviness in the head, especially on stooping. Mental symptoms may be expressed by Citelli's syndrome, characterized by defective memory, somnolence, insomnia, intellectual deficiency and unwillingness to concentrate.[12]

The ocular manifestations are pain in and about the eye; asthenopia; diplopia; photophobia and impaired vision from papilledema or optic atrophy.[23] The papilledema is usually in the form of a neuritis rather than a true edema (choked disc) with diminished visual and color acuity, and concentric contraction of the color fields, often associated with central scotoma.[6 18 22 26 30]

The general symptoms are nausea; vomiting, gastro-intestinal and respiratory disturbances; arthritis; polyuria; polydipsia; fever, and rapid pulse.

Objective symptoms seen on examination are a turgescent nose usually with a high deviation of the nasal septum, with or without pus in the olfactory fissure or nasopharynx, hyperplastic rhinitis or posterior hypertrophies, with granulations or pus about the ostium on nasopharyngoscopy. Roentgen ray with or without lipiodol injection and exploratory puncture of the sinus may confirm the diagnosis.

Intracranial Tumors.—All intracranial tumors may be regarded as slowly growing foreign bodies which sooner or later, according to their situation within the cranial cavity, produce phenomena which render their diagnosis possible. They in general give rise to two types of signs and symptoms: (1) localizing symptoms, and (2) general pressure symptoms. If the former are present the localization is automatically made. But the overwhelming proportion of brain tumors give rise to the so-called pressure symptoms: (1) headache, (2) nausea and vomiting, (3) vertigo, (4) tinnitus, and (5) gradual loss of vision, papalledema (choked disc).[7]

These symptoms may be found in sphenoiditis, but in brain tumor are characterized as follows: headache is excruciating and usually of a definite time, early in the morning;[13] nausea is sudden and vomiting projectile in type; tinnitus and vertigo are due to involvements of labyrinth and its nerve tracts. In some instances the tinnitus and vertigo are due to choked labyrinth characterized by Alexander as follows: (1)

history of slow progressive deafness; (2) high pitch tinnitus; (3) vertigo, usually with opposite nystagmus; (4) lowered upper tone limit, out of proportion to the diminished capacity of hearing; (5) elevated lower tone limit; (6) diminished Schwabach test; (7) positive Rinne; and (8) negative Galle test; (9) changes of the labyrinthian reflex excitability; (10) wrong pointing with pointing test.[1]

Fisher and Haebermann describe the histopathology as follows: (1) passive hyperemia; (2) exudative changes; (3) hemorrhages; (4) changes in blood vessels of inner ear; (5) circumscribed obstruction; (6) cellular infiltration and diapedesis; (7) agglutination and adhesions in the region of membranous labyrinth; (8) degenerative atrophies of nerve ganglion apparatus and nerve endings; and (11) osseous degeneration. The choked disc is self-evident.[1]

Probably all brain tumors which produce increased intracranial pressure produce changes in size, shape or position of the ventricles. Thus localization may be facilitated by pneumo-ventriculography and roentgenograms of the skull, which may be facilitated by tests of the field of vision and labyrinth examination to conclude a diagnosis.

Differential Diagnosis in General.—Because of the seriousness and magnitude of such an operation as an exploratory craniotomy, and the dangers of a sphenoidectomy, every procedure available should be used in the differential diagnosis of intracranial lesions and sphenoiditis.

Their diagnosis requires a thorough knowledge of the various types of sphenoiditis, the ability to recognize the early focal signs and symptoms of intracranial tumors, and to recognize such other intracranial involvements as multiple sclerosis, arteriosclerosis, chronic cystic arachnoiditis, fibrosis of meninges (from post-traumatic hemorrhage), cerebrospinal syphilis, tuberculous and luetic, serous and purulent meningitis, and intracranial aneurysms.

In intracranial lesions other than tumors and meningitis, the history, general examination, a study of the serologic changes, both spinal fluid (Wassermann and colloidal gold) and blood, and the roentgen ray will bring about a diagnosis if pneumoventriculography and rhinologic examination are negative and the temperature is normal.

There are some acute sphenoidal empyemata which simulate early meningitis. They occur because of a very intimate anastomosis between the blood supply of the paranasal sinus and cra-

DIFFERENTIAL DIAGNOSIS IN GENERAL

BRAIN TUMOR	SPHENOIDITIS
I History: gradual onset with negative sinus history.	I History: rapid onset of symptoms; frequent colds; post-nasal dripping; nasal obstruction; and exacerbations.
II Headaches: definite onset in early morning.	II Headaches: lower half frontal and occipital with Vidian and Sluder syndromes which may be relieved by cocainization of sphenopalatine ganglion.
III Papilledema (choked disc) with anopsias; (quadrant and hemianopsias; sector defects. (Visual fields.)5 10	III Papilledema (usually a toxic29 neuritis): with rapid loss of vision; central scotoma; concentric contraction of light and color fields; diminished color acuity and enlargement of blind spot. (Visual fields.)6
IV Nausea and vomiting: projectile and spasmodic.	IV Nausea and vomiting: associated with gastro-intestinal disturbances.
V Vertigo: usually abnormal vestibular reactions.19	V Vertigo: especially on stooping with fullness or tightness of head; normal vestibular reactions.
VI Choked labyrinth: with deafness; normal ear on auscultation and inspection.1	VI No choked labyrinth: never deafness without middle ear disease.
VII Tinnitus with normal ear on auscultation and inspection.	VII Tinnitus: usually with middle ear disease.
VIII Nystagmus: normal middle ear on inspection; abnormal equilibrium tests.	VIII Nystagmus: only with middle ear disease and exaggerated equilibrium tests.
IX Pulse: slow.	IX Pulse: normal or rapid.
X Rhinoscopy: negative.	X Rhinoscopy: one or more signs of sinus disease; turgescence, hyperplasia, pus (although this may be negative).
XI Localizing signs of intracranial lesions: may be present.	XI Localizing signs of intracranial lesions: always absent.
XII Sphenoid washing: negative.	XII Sphenoid washing: pathological.
XIII Roentgen ray: pneumoventriculography; changes in the bony structures of cranium as necrosis of clinoid processes and internal auditory meatus; pressure changes in skull, etc.20 25	XIII Roentgen ray: changes in the sphenoidal sinus of Granger line. Confirmation with lipiodol.14 15

nial structures which is sufficient to produce alarming mental symptoms such as violent headaches, nausea and vomiting, nervousness, stiff neck, vertigo, poor vision (optic neuritis), diplopia and muscular reactions varying from spasmodic twitchings simulating attacks of Jacksonian epilepsy to convulsions with a temperature of 99-104°.[24] In such cases diagnosis can be made by history, roentgenogram, temporizing, and rhinologic and serologic examination.

The intracranial lesions which most frequently simulate sphenoiditis are early lesions of the silent areas of the cerebrum involving the frontal and prefrontal gyri, island of Reil, central nuclei, thalamus and optic thalamus, corpus callosum, lateral ventricles and certain of the tumors of the floor of the fourth ventricle and sella turcica. Diagnosis is considerably more difficult when the previously mentioned lesions are associated with paranasal sinus disease.

To facilitate the differential diagnosis of intracranial lesions and sphenoiditis it is necessary to classify the intracranial lesions as follows: (1) intracranial lesions with localizing symptoms; (2) intracranial lesions with choked disc; (3) intracranial lesions without choked disc.

Intracranial Lesions of First Classification.— In lesions of the first classification with localizing phenomena in addition to the more general characteristic signs and symptoms of intracranial hypertension, differential diagnosis is very simple. The lesion may be due to a tumor of the temporal lobe with loss of sense of position, astereognosis, adiodokokinesis, contra-lateral facial paralysis, vertigo and tinnitus, aphasia and homonymous quadrant anopsias and unilateral choked disc; tumor of the occipital lobe with homonymous hemianopsia, visual hallucinations and posterior fossa symptoms with no choked disc, tumor of the parietal lobe with irritative symptoms in the form of sensory fits, sensory monoplegias, astereognosis and word blindness; tumor of the cerebellum with unsteadiness, and ataxic gait, diadochokinesia, nystagmus, bilateral choked disc and the characteristic cerebellar vestibular reactions; tumor of the cerebellopontine angle with deafness, tinnitus and vertigo confirmed by vestibular tests with no reaction of vertical canals and dead cochlear on the affected side, no reaction of vertical canals of the opposite side, usually involvement of the adjacent fifth, sixth and seventh cranial nerves, and unilateral choked disc at onset. It may be due to a tumor of the centrum ovale (internal capsule) with unilateral convulsions and monoplegias, hemiplegias and at times hemi-anesthesia with attacks of unconsciousness; tumors of the mid-brain and corpora quadrigemina with involvement of the third and fourth nuclei with ophthalmoplegia and ptosis of the upper lid, loss of convergence, sluggish or absent light reflex and deafness of the opposite ear from involvement of the inferior colliculi, ataxia if superior cerebellar peduncle is involved, and blindness with no choked disc if the geniculate body is involved. Or it may be due to a tumor of the pineal body with internal hydrocephalus because of pressure on the interventricular foramina, excessive body and genital growth and usually involvement of the third nerve. It may be due to a tumor of the pons with alternate paralysis of the fifth, sixth and seventh cranial nerves of the same side with hemiplegia and hemi-anesthesia of the contra-lateral arm and leg, diplopia, dysphasia, progressive deafness, poor memory, nystagmus and ataxic gait; or a tumor of the medulla with dysarthria, dysphasia, disorders of deglutition, defective movements of the soft palate and vocal chords from involvements of the ninth, tenth, eleventh and twelfth cranial nerves, followed by respiratory and circulatory involvements.

BRAIN TUMOR	SPHENOIDITIS
I	I
Choked disc: (papilledema).	Optic neuritis: (usually papillitis).
II	II
Vision: fair in proportion to degree of choking.	Vision: poor in proportion to the degree of choking.
III	III
Central scotoma: absent except in frontal lobe tumors.	Central scotoma and enlargement of blind spot.
IV	IV
Visual fields: quadrant and hemianopsias and sector defects.	Vistual fields: concentric contraction of light and color fields.
V	V
Color acuity: normal.	Color acuity: diminished.
VI	VI
Choked labyrinth: (a) Lowering of upper tone limit. (b) Elevation of lower tone limit. (c) Diminished Schwabach. (d) Postive Rinne. (e) Negative Galle for otosclerosis. (f) Labyrinthine reflex excitability.	No choked labyrinth.
VII	VII
Deafness: with normal middle ear on inspection and auscultation.	Deafness: when present with middle ear disease.
VIII	VIII
Roentgen ray: pneumoventriculography is positive.	Roentgen ray: changes in sphenoid sinus or Granger line.

Intracranial Lesions of Second Classification.—In the differential diagnosis of lesions of the second and third classifications of intracranial tumors and sphenoiditis, the second classification, or those lesions with choked disc, is easier.

Intracranial Lesions of Third Classification.—The differential diagnosis of lesions of the third classification, those without choked disc, is hardest, and in some cases both the neurologic and ophthalmologic examination may be negative.[20] The patient's subjective symptoms cause him to seek relief for the predominating complaint, headache, with or without dizziness and general fear of impending danger and with the eye symptoms unrelieved by the ophthalmologist, he visits the rhinolarygologist only to have one or more sinus operations in vain.

Such intracranial lesions are found in the brain stem, central nuclei, hypo and optic thalamus, corpus callosum, and anterior and middle fossa, such as frontal, temperosphenoidal and occipital lobes, where pressure cannot be exerted upon the cavernous, superior and inferior petrosal, or sigmoid sinuses to bring about choked disc. In such cases there is no choked labyrinth, consequently in some early cases, differential diagnosis cannot be made.

When the lesion progresses and pressure on the adjacent structures takes place, as in lesion far back in the middle fossa, pressure is made on the tentorium which brings about posterior fossa symptoms, nystagmus and ataxia, and diagnosis is possible. The nose and ear findings are negative. An examination of the fields of vision shows scotomata relative or absolute, anopsias, hemi, homonymous, heteronymous or altitidudinal, quadrant or sector defects, and blind spot anomalies, with disturbances of smell, and a positive pneumoventriculogram, which brings about a diagnosis.

Optic atrophy following sphenoiditis of long standing from an old optic neuritis may simulate several intracranial lesions as[9 27 28] (1) optic atrophy of pituitary disease which has associated with it a suppression of sex function, acromegaly, polyuria or other hyperpituitary symptoms in addition to the more characteristic bitemporal hemianopsias not found in sphenoiditis;[3 10] (2) optic atrophy from cicatrical contraction with incarceration of optic nerves or chiasma from an old fracture of the base, both of which may be cleared up by history and examination.

DIFFERENTIAL DIAGNOSIS OF THIRD CLASSIFICATION

BRAIN TUMOR	SPHENOIDITIS
I	I
History: gradual onset of symptoms with negative sinus history.	History: dizziness on stooping, fullness or tightness of head, frequent colds, post-nasal dripping, nasal obstruction, exacerbations.
II	II
Headaches: definite onset in early morning.	Headaches: lower half frontal and occipital, with Vidian and Sluder syndromes usually relieved by cocainization of sphenopalatine ganglion.
III	III
Nausea and vomiting: sudden, projectile and spasmodic.	Nausea and vomiting: associated with gastro-intestinal disturbances.
IV	IV
Rhinoscopy: negative.	Rhinoscopy: one or more signs of sinus disease.
V	V
Disturbances of smell with open nose.	Disturbances of smell with turgescent nose.
VI	VI
Visual fields: anopsias, hemiquadrant, altitudinal and sector defects and blind spot anomalies.	Visual fields: concentric contraction of light and color field.
VII	VII
Normal color acuity.	Diminished color acuity.
VIII	VIII
Roentgen ray: pneumoventriculography positive.	Roentgen ray: changes in Granger line or sphenoidal sinus. Lipiodol injection.
IX	IX
Sphenoid washing negative.	Sphenoid washing pathological.

As an appendage to this paper are three case histories.

CASE REPORTS

Case 1.—Mrs. R. M., a white woman, age 43, developed influenza six years before I saw her, followed by frequent colds in the head, nasal obstruction, left frontal, parietal and occipital and headaches, dizziness, nausea and vomiting with pains in the epigastrium and rheumatism. After having been treated for gall bladder disease, she was referred to an otolaryngologist, who for four months treated the left frontal and sphenoidal sinusitis for which a left sphenoidectomy and submucous were done with no improvement of headache, nausea, vomiting or dizziness, although her rheumatism disappeared. Later she entered a general hospital with a diagnosis of frontal and sphenoidal sinusitis and cholecystitis. In the routine examination bilateral choked disc was found, loss of hearing in the left ear, nasal obstruction with purulent drainage of the left side, tenderness over the gall bladder region, tenderness on pressure over the left frontal sinus, slight weakness of the external recti muscles, positive Rhomberg, and difficult walking due to swaying to the left. The spinal fluid was negative. Its pressure was 30 mm. of mercury. There was an abnormal response to douching the left ear. The right ear was normal.

X-ray showed considerable thinning and widening of the left internal auditory canal. A diagnosis of left acoustic nerve tumor was made. Aug. 15, 1927 an exploration of the posterior fossa was done and an acoustic nerve tumor (neuroma) was removed from the left side near the cerebello-pontile angle. The patient died.

Autopsy showed a normal gall bladder and neuroma of the left acoustic nerve.

Case 2.—A boy, age 18, complained of headache in the frontal, parietal and occipital regions and dizziness of two years duration with post-nasal dripping, obstruction of both sides of the nose, and occasional epistaxis of the right nostril. In June, 1925, he caught a cold in the head and developed earache in the right ear for which paracentesis was done. This was followed by increased dizziness, post-nasal dripping, and fullness of the right ear. A diagnosis of deviation of the nasal septum and right sphenoiditis was made.

In August, 1925, a submucous was done. Six months later the symptoms had increased and a right sphenoidectomy was done. This was followed in three months by a weakness of the right side of the face, loss of taste on the right side of the tongue, impaired movements of the right eye (ophthalmoplegia), ptosis of the right upper lid, salivation, projectile vomiting and proptosis of the right eye.

There was loss of the light and accommodation reflexes of the right eye; anesthesia of the right side of the face and cornea; his speech had a nasal twang; there was occasional difficult swallowing and cervical glandular enlargements which developed within one year. On later examination considerable nerve deafness was detected in the right ear, and bilateral choked disc 4 diopters with marked contraction of the visual field of the right eye and slight homonymous hemi-anopsia with enlargement of the right internal auditory canal on roentgenogram, which suggested the possibility of an intracranial lesion.

March 11, 1927, exploratory craniotomy of the middle fossa revealed the condition. The patient died three hours following operation. Autopsy revealed an endothelioma involving the base as far as the right temporal bone and internal auditory meatus and down the carotid sheath into the neck.

Case 3.—D. S., a white man, age 28, was referred to an otolaryngologist by an ophthalmologist for nasal examination. His history dates back to eleven years before (1916) when he developed dizziness more noticeable on lying down on his pillow. This became so bad that at times it was associated with vomiting. It was also associated with post-nasal dripping, occasional colds, and progressive deafness of the left ear, until in September, 1927, he developed severe headaches and weakness of the eyes, failing vision and weak spells (falling to right).

The report by the ophthalmologist was that vision in both eyes was 20/200 and that the fields of vision could not be taken. He had bilateral choked disc of 4 diopters. On January 25, 1928, a bilateral sphenoidectomy was done, followed by an improvement of vision in both eyes to 20/50. Continuous study after improvement of vision showed in the fields of vision an upper quadrant bitemporal anopsia and x-ray evidence of an intra-sella tumor projecting downward into the left sphenoid. The spinal fluid was negative. Because of the loss of hearing and normal left middle ear on inspection with the fields of vision and x-ray findings, a diagnosis of tumor of the sella turcica was made. Because of the bilateral choked disc instead of the classical optic atrophy found in sella turcica tumors, a supra-sella cyst was diagnosed. An exploratory craniotomy of the anterior fossa was done and what was interpreted as a pituitary cyst was found. The patient died 12 days later and autopsy showed an ependymoma of the roof of the fourth ventricle. The supposed cyst was in reality a dilated third ventricle.

CONCLUSIONS

(1) The symptomatology of the two diseases may be similar.

(2) The differential diagnosis of these two affections is dependent upon a close neurologic, ophthalmologic and otorhinologic examination combined with roentgen ray and ventricular study. A scrupulously detailed history by the neurologist, especially the fields of vision studied by the ophthalmologist, and complete equilibrium and particularly thorough hearing tests in addition to a sinus study of the nose by the rhinolaryngologist with emphasis on the roentgen ray, and exploratory puncture of the sphenoid are necessary.

(3) To facilitate the differential diagnosis of these two conditions, intracranial lesions may be classified into three groups, two of which groups may be simulated by sphenoiditis.

In class one, or lesions with focal symptoms, it is the least difficult to make a diagnosis because it is self-evident that the focal symptoms confirm not only the diagnosis but the location of the lesion.

In class two, or lesions with choked disc, it is less difficult, but in sphenoiditis the papilledema is almost invariably an optic neuritis characterized by sudden loss of vision and central scotoma, enlargement of the blind spot, and concentric contraction of light and color fields; whereas in brain tumor the ears are normal on inspection, and there is choked labyrinth.

Class three, or lesions without choked disc, is most difficult to differentiate. Usually focalizing signs with fields of vision, and posterior fossa symptoms with negative ear and pathological nose findings, facilitate the diagnosis.

(4) And finally, mistakes have been made in the diagnosis of these two affections. It is possible to differentiate them only by keenness of judgment and careful study with systematic and frequently prolonged or often-repeated examinations. Therefore, any suspicious sphenoiditis with normal ears on inspection and auscultation with diminished hearing and evidences of choked labyrinth, with papilledema, diminished sight and disturbances of visual fields, should be examined for brain tumors.

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Discussion follows paper of Dr. Davis, page 490.

EYE SYMPTOMS IN BRAIN TUMOR*

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The following ocular disturbances occur in brain tumor:

(1) Disturbance of the field of vision.

(2) Changes in the optic discs: neuritis, choking and atrophy.

(3) Paralysis of the extra-ocular muscles.

(4) Pupillary symptoms.

(5) Exophthalmos.

(6) Nystagmus.

(7) Vertigo.

(8) Visual hallucinations.

The earliest symptom, and hence that of greatest importance, is the field changes. Papilledema ranks next in importance; it takes second rank because it is a later change. According to Cushing, all brain tumors will at some time in their course, if the patient lives long enough, produce choking of the optic disc. The visual field changes occur very early. In connection with headache they may be the only symptoms and hence the patient often first consults the ophthalmologist. The public is thoroughly alive to the fact that headaches come frequently from the eyes, and hence it seeks relief from this source often before seeing the family physician. It is my custom to scrutinize carefully the eye grounds and go over the visual fields in chronic intractable headache the origin of which is in doubt.

It requires care and the proper apparatus to do this with promptness and accuracy. The perimeter should not have a carrier for the test objects; it should be of the simplest possible design, well lighted and the test objects of varying sizes and the proper colors so far as it is possible to obtain them. The carrying discs should be on slender matt black wires with no rims or at least the rims should be as inconspicuous as possible. The perimeter should have as a background the Bjerrum screen or other dark surface. The periphery of the field may be taken best with the perimeter, while the central area, including the 30 or 40° circle, may best be studied on the screen. One may go over the fields in a very thorough manner in this way in

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

fifteen or twenty minutes when one becomes facile with practice.

Traquair, in his recent book, gives clear and most practical methods of visual field work. It is not easy to get the proper combinations of test objects, lighting, accurate screen with charts and perimeter. One has to go to a great deal of trouble in this regard. To secure really accurate results the operator should have black gloves and a black gown.

Disturbances of the Field of Vision.—Cushing and Walker at one time believed that interlacing of the color fields was one of the early symptoms of pituitary tumor, but are less inclined to take this view at this time. Quadrant defects of the visual fields suggest tract involvement though the lesion may be in the cortex. Careful study may show whether the defect is above or below the calcarine fissure. Distortion of the fields is often one of the earliest manifestations not only of the pressure of the tumor, but also of its position.

Hemianopic manifestations may occur from involvement of the chiasm, the tracts, optic radiations or cortex. Such manifestations may be in the form of relative, bilateral or hemianopic scotomata or color scotomata which may be hemianopic. These scotomata may be very small and require much patient investigation before they can be demonstrated: numerous sized test objects should be used at distances of one and two meters from the screen for such work.

Numerous field studies must be made in cases of suspected intracranial tension. One examination is misleading and insufficient. After subtemporal decompression visual field distortion disappears, but this is only a temporary relief. Hence an examination of these patients at intervals is necessary so that a return of the pressure symptom may be promptly recognized. When optic atrophy has occurred the occipital lobes, optic tracts and radiations become silent so far as objective signs for regional diagnosis are concerned. It is obvious how necessary it is to secure such important evidence as study of the visual fields accords before this atrophy takes place. It is equally obvious that optic atrophy as a result of increased intracranial pressure should not be allowed to occur without operative interference.

Binasal hemianopsia most often occurs in cases of subtentorial growths which have led to a symmetrical change in the two nerves due to secondary atrophy without direct implication of the visual pathway itself.

When the vertical breadth and the anteroposterior course of the geniculo-calcarine fibers is considered it will be seen that every tumor of the hemisphere except those situated in the frontal or superior parietal regions may be expected at some period of its enlargement to exert some pressure effect on the upper or lower portion of the radiation. When this shows itself as a beginning homonymous defect in the upper or lower parts of the field it may be of great value in localization.

The hemianopsias resulting from hemorrhage and softening are apt to be sharp-cut and abrupt in onset. Not so in tumor; here the condition is slowly progressive and complicated by general field constriction. There may be only a tendency toward a hemianopic defect and this may be as suggestive as though the defect were vertically complete. These defects may be in the colors alone, relative defects only. Cushing and Heuer speak of a number of instances of dyschromatopsia, color interlacing, accompanied by an incipient grade of choked disc, both conditions being more marked on the side of the lesion. Until color perception is completely lost, interlacing is often apparent even in the greatly constricted color peripheries characterizing the advanced stage of choked disc. As was before mentioned, less dependence is now placed upon dyschromatopsia.

It is probable that relative or color defects may be equally appreciated in the fields for white by using very small test objects subtending an angle as little as 0.5°. In advanced choked discs, that is, the fifth stage of Marcus Gunn (decreasing vascularity of the papilla with connective tissue formation, constriction of the discs and beginning atrophy of the nerve) only a small temporal field may remain in either eye. There is binasal blindness. This condition may occur not infrequently after operative procedure in which the intracranial pressure is relieved. The progressive changes continue in the nerve head with the formation of scar tissue and the binasal blindness results. This is seen, it will be observed, in the declining period of choked discs when the active stage is subsiding and scar tissue and atrophy are supervening. Binasal hemianopsia is very rare and its causes are difficult to ascertain. It has been observed in association with tabes, fracture of the base, syphilitic disease about the chiasm, advanced arterio-sclerosis and bilateral lesions. In 50 per cent of the recorded cases it has accompanied a neuro-retinitis or other supposed inflammatory disease of the optic nerves. Sclerosis of the

carotids has been considered a cause, exerting pressure against the uncrossed temporal fibers.

After an internal hydrocephalus has lasted for some time the crowding of the cerebrospinal fluid into the subarachnoid spaces of Schwalbe's sheath and the consequent persistent neuroretinal edema leads to round cell infiltration and the formation of connective tissue, contracting scar formation, and to the so-called secondary atrophy. One cannot, however, ascribe the binasal blindness to a lesion confined to the nerve head. Another factor may be the dilated third ventricle forcing the exposed nerves, chiasm or tracts downward and outward against the resistant carotid vessels.

The characteristic of field deformations due to chiasmal lesions is their progressive nature rather than their form. According to Cushing and Heuer, there are four groups: (1) bitemporal and (2) homonymous hemianopsia; (3) irregular defects; and (4) blindness in one or both eyes. The line of cleavage in hemianopsias is much sharper in posterior (tract and cortical lesions) than in anterior (chiasmal lesions).

Cushing believes the crossed fibers are more frequently involved because they are strangulated by the interweaving when the hypophyseal growth pushes up from below. The uncrossed fibers are not thus strangulated, since they are not interwoven. Possibly the interference with the blood supply may have an important bearing on this. The great recoverability of such lesions following removal of the pressure lends support to this view.

The strangulation of the crossed fibers increases as the growth of the tumor increases the pressure until complete bitemporal hemianopsia occurs, and then the progress of the field failure may hesitate for some time. This hesitation represents the amount of additional pressure required to involve the uncrossed bundle. Cushing remarks that the study of specimens leads one to believe that there is almost as much individual variation in tolerance to pressure on the optic nerve as there is in tolerance to the various toxic agents such as tobacco and alcohol. In suspected chiasmal lesions the fields should be carefully plotted as early as possible, since supervening atrophy may destroy the localizing value through contraction of the field.

Walker says color defects are always represented by form defects when the visual angle used in testing is small enough.

A homonymous hemianopsia, whether or not the macular is spared, which is accompanied by a primary optic atrophy, is of chiasmal origin usually due to pituitary disease. One accompanied by choked disc probably involves the radiations.

Frequently in the quadrantanopsia of temporal lobe lesions the defect on the side of the lesion will be in advance of the other. Fractures of the base of the skull involving the temporal lobes, as they are very apt to do, produce sharply cut angulated homonymous defects in the visual fields.

In temporal lobe lesions visual hallucinations, when present, are very marked: there are pictured scenes, animals or strange looking individuals such as gnomes. These hallucinations are on the side of the defective visual fields, that is, on the side opposite the lesion, and would seem to indicate damage to the geniculocalcarine functions. It might be thought that involvement of the occipital lobes would cause visual hallucinations more marked than elsewhere, but they appear to be less common. When present they are more apt to be of colors and light rather than of pictured scenes.

Cushing says these hallucinations in temporal lobe lesions seem to be part and parcel of the uncinate seizure. During the few moments of unreality or dreamy state, often while experiencing the olfactory or gustatory aura, there appear, usually toward one side, figures or shadows of people, animals or inanimate objects. They may be diminutive, enlarged, grotesque or normal forms. The weight of evidence seems to be that these hallucinations probably indicate a tumor of the temporal lobe and not of the occipital lobe or optic tracts. It does not follow that the temporal lobe is the seat of visual function. According to the psychologists it probably means a release of inhibition, and hence the very complex function of memory pictures.

In making a diagnosis between a temporal lobe and a cerebellar lesion the perimeter is the court of last resort. In the vast majority of temporal lesions there is a homonymous field defect, indicating involvement of the temporal loop of the optic radiations. Partial bilateral defects short of hemianopsia are especially characteristic of involvement of the optic radiations in this region.

According to Emory Hill, tumors of the supramarginal and angular gyri cause homonymous hemianopsia and in left-sided cases word blindness. De Schweinitz, discussing Lillie's paper on ocular phenomena produced by intracranial lesions involving the optic tracts near the chiasm,

says that paracentral scotomata are common and often early manifestations. They may be bitemporal and expand into a large or complete bitemporal defect, meeting a contraction which begins in the temporal periphery.

It is probable that the very earliest changes are to be discovered about the blind spot and may be continuous with it. Careful analysis of these changes indicate that they, like the general field, are divisible into quadrants. These foci have been ascribed to pressure foci, to traction produced by a growing tumor, to vascular constrictions and probably to a toxic action on the macular fibers. Most of the field defects may be detected by small white objects, but it is not wise to disregard the use of color tests.

Dandy says of brain tumors, they are rare and their mortality is high because they are unrecognized. So was appendicitis until its symptoms became known. It is now neither rare nor has it a high fatality because it is recognized early, diagnosed early and operated upon early. The same holds true in brain tumor. Proper study will show it to be a common condition and consequently early diagnosis and operation will show it to have not necessarily a high mortality: and the earliest symptoms are most frequently changes in the visual fields. In other words, it is the ophthalmologist who should first invite attention to these cases.

Localization of the tumor is quite as important as the diagnosis of its presence: the visual field findings are as important here as in making the diagnosis of tumor. Pneumography, that is, roentgenography of the brain after injecting air into the ventricles or subarachnoid spaces, enables us to diagnose and localize all brain tumors which cause pressure in the early stages of the growth. In primary glioma of the chiasm the field changes are not the characteristic bitemporal ones of pituitary disease, but are apt to be bizarre. The progress of the growth is much slower than in pituitary disease and consequently the field defects progress very slowly. Cushing and Walker, in a study of optic nerve atrophy in connection with chiasmal lesions, remark that in a majority of cases the first perimetric indications of the process when the 5 mm. test objects are used is a slant in the upper temporal field and corresponding quadrantic defect in the color field. The advance of this defect takes place downward with successive involvement of the lower temporal, then the lower nasal quadrants. That is, the obliteration of the field takes place in a clockwise direction in the right eye and counter clockwise direction in the left eye, beginning in the temporal field in both instances.

We remember that the grouping of the retinal fibers in the optic nerve and chiasm takes place by quadrants. Those from the upper temporal quadrant form one group, from the lower temporal quadrant a second group, from the lower nasal a third, and from the upper nasal a fourth. Thus we can understand the direction and course of the obliteration of the visual field as these successive quadrants are destroyed in the nerve, chiasm or tract where they more or less maintain the quadrantic grouping.

Vision has been known to return in blind eyes even when pupillary reactions have been lost. A ganglion cell of the retina can support its central neuron up to the point of pressure in the chiasmal region long after functional discontinuity and atrophy of this fiber central to the point of pressure has taken place.

Of the changes in the disc, papilledema is perhaps the most important: it is an edema of the nerve head due to the forcing of the cerebrospinal fluid through the sheath of the nerve or to the interference with the return circulation. After it has existed for a period, round cell infiltration takes place, following which the usual changes occur and scar tissue is formed, which is the period usually of secondary or neuritic atrophy.

Optic neuritis is, as the name designates, an inflammation of the nerve; it may not be distinguished always by an ophthalmologic examination from papilledema. Indeed, the two conditions may be coexistent or the one may merge into the other.

According to Cushing, choked disc is absent in all cases of brain tumor at an early stage, in most cases until a late stage. When present it is a very valuable sign. Tumors allowed to run uninterruptedly their full course will all probably show a certain stage of choked disc before the end. Tumors in the posterior cranial fossa usually present early choked disc. Horsley thinks the edema always begins in the upper nasal quadrant. This is the earliest in cerebellar tumors. The tumor lies most frequently upon the side of the eye first affected. Choked disc on one side and optic atrophy on the other indicates tumor upon the side of the choked disc. This combination is often seen in frontal lobe tumors. A central scotoma may indicate pressure on the nerve or chiasm. Tumor may produce symptoms closely simulating retrobulbar neuritis as one of the earlier manifestations.

We should take care to correlate our eye findings with the attending symptoms so that they may be properly evaluated.

With double choked disc the disc is higher on the side of the tumor; choking usually occurs when the tumor is close to the ventricular system. By its growth it causes obstruction to the circulation of the cerebrospinal fluid and consequent internal hydrocephalus. The changes in the nerve head, it is obvious, depend more on the location of the lesion than on its size. Hypertensive neuritis may be closely simulated in brain tumor: papilledema and hypertensive neuritis may co-exist. The percentage given of choked disc in brain tumor, 70 to 80 per cent, is apt to be misleading, since this depends entirely on the stage of the disease in which the patient comes under observation. With the exception of tumors in which the growth primarily originates in or near some vital center in the brain stem, causing sudden death before general pressure symptoms are manifest, all brain tumors may ultimately be expected to show a choked disc. Even with a declining choked disc and only light perception remaining there may be hope of saving some vision.

In the hypophyseal group, due to the fact that Schwalbe's sheath becomes blocked off early in the process so that the usual hydrostatic process cannot take place, choking of the disc does not always occur, although increased intracranial pressure with severe headache, nausea and vomiting may later take place. When choked disc does occur in this condition it is usually moderate and speaks for a growth of considerable size. Atrophy does not take place for six months or more. Hence an eye in which no light perception, but only a pupillary reaction to light remains, may recover if it has not been allowed to go on too far.

Elsberg says in cerebellar pontine angle growths that papilledema may be sudden and its progression very rapid, usually most advanced on the side of the lesion. If the local pressure conditions are greater on the side of the tumor due to lateral ventricular distension, hyperplasia or pressure of the tumor itself, the papilledema on that side will be greater. If the pressure in the contralateral ventricle is greater due to its distension, the papilledema will be more marked in the eye opposite the lesion.

As has been remarked, tumors of the frontal lobes not rarely show pallor of the disc or primary atrophy on the side of the tumor and a papilledema of slight degree on the opposite side. This condition is rare in other intracranial lesions, though it may occasionally be seen in pituitary growths with temporal field defects where there is a large suprasella growth and where a papilledema in one eye is superimposed upon a preceding optic pallor.

One must remember that nasal accessory sinus disease may cause changes in the optic discs and visual fields. Such a possibility should be borne in mind, but in every case disturbances of discs or fields should be looked upon as indicating possible brain tumor and the proper steps should be taken to make the diagnosis. One sees cases of brain tumor that have been treated to much nose and dental surgery as well as other measures while the vision of the patient was being destroyed by increased intracranial pressure.

When one sees an optic neuritis or papilledema the most serious potentiality should be considered first. When the possibility of tumor is eliminated we can then go ahead with the removal of the probable foci of infection. To delay making a diagnosis is to lose the opportunity to save the patient's vision or life.

Tumors of the hemispheres lying farthest from the median line more often cause papilledema equal in the two eyes; mesially placed growths such as those from the pineal gland or interpeduncular space do likewise.

Dural growths over the motor area may cause unilateral convulsive seizures and slowly progressive loss of strength of the extremities of the same side long before disc changes occur. Tumors at the base of the brain are apt to produce cranial nerve involvement. Cerebellar tumors produce frequent and early choked disc, ataxia, vertigo, rolling gait and nystagmus. The general increase of intracranial pressure damages vision. Hemianopsia is absent; paralysis of movements of the eyes and conjugate deviation, together with sixth nerve palsy, may occur. Lillie says that after operation visual improvement may be expected only when there are normal fields or pallor of the disc without loss of substance. Pallor of the disc, due to chiasmal pressure of long duration, may show no areas of degeneration in the disc. The frequency of improvement after such lesions shows that the condition is due to block and not to real atrophy. It is important to distinguish pallor of the disc without loss of substance from atrophy. Horrox thinks it impossible to distinguish between atrophy with and without loss of substance. He thinks in the Brigham Clinic they can distinguish between the type of atrophy oc-

curring in tumors around the chiasm and those occurring in other types of atrophy as in tabes. He also remarks: "We have given up color fields and rely on the small test objects on both perimeter and screen." It is worth recording here that Cushing says that next to the microscope the ophthalmoscope is the most important instrument we have.

Vascular lesions closely resemble brain tumor at times and can with difficulty be distinguished from it. The symptoms may be identical. Sclerosis of the retinal vessels may not be present. The onset may be slow and insidious or sudden. It is now commonly held that it is not so much increased intracranial pressure, but increased intraventricular pressure which causes choked disc. All cases of internal hydrocephalus, however, do not show choking of the disc.

Choked disc is the best single sign of brain tumor. It is most frequently found in tumors of the pineal and quadrigeminal region. It is usually a late sign.

Sharpe's remarks on correlation of the pressure of the spinal fluid at lumbar puncture and choked disc are significant. By this means accurate determination of their value may be had.

When a blurring of the disc is noted following a head injury, when a brain tumor or abscess is feared, or following a difficult labor when convulsions occur, it is very important to record accurately the pressure of the fluid at lumbar puncture. There is no difficulty in instantly recognizing a full blown chocked disc, but the earliest signs of beginning papilledema must be recognized if we are to be of any real value to the neurologist and the brain surgeon. We must remember that frequently repeated fundus examinations are necessary. A correlation of the visual acuity, visual fields, spinal fluid pressure and early disc changes is essential.

Retrobulbar neuritis with central scotoma and beginning atrophy on the side of the lesion with concomitant papilledema on the opposite side as a syndrome of tumor of the anterior fossa was recognized by Kennedy in 1911.

According to Knapp, paralysis of the third and sixth cranial nerves indicates a basal lesion. Paralysis of the abducens when present in cerebellar tumors lies on the side of the tumor in 75 per cent of the cases. The fifth nerve may be involved, causing local anesthesia and neuroparalytic keratitis; involvement of the seventh may cause facial paralysis; or of the eighth, deafness.

Barany believes ocular nystagmus to be a cerebral phenomenon, the slow phase being activated from the gyrus angularis and the quick phase from the frontal lobe. We remember that nystagmus is composed of two components, a slow movement to one side and quick jerk back; the designation is in the direction of the quick jerk. Stevens thinks ocular nystagmus is a cerebral reflex with a centripetal center in the occipital lobe and a centrifugal center in the frontal lobe, the two centers connected by a reflex path. An interruption of this long reflex path or one of its centers is the simplest explanation of the fact that the nystagmus may be abolished to the one side by lesions so variously situated in the brain. The occipital lobe appears to be concerned, since lesions in this region disturb nystagmus. A unilateral lesion in the fore brain can disturb lateral optic nystagmus to the opposite side only.

Freeman says there has been no case of angle tumor which has caused clear-cut paralysis of associated lateral movements of the eyes with preservation of convergence. Since the angle tumor is accessible and a pontile tumor is not, it is obvious how important is the diagnosis. Clear paralysis of associated lateral movements with preservation of the power of convergence means a lesion of the posterior longitudinal bundle. In the posterior longitudinal bundle descending fibers pass to the level of the sixth nucleus. As this nucleus lies almost adjacent to the bundle, there is no distinct tract connecting the two structures. A lesion of this tract or of the abducens itself will cause paralysis of associated movements to the right, and if the third nucleus is not involved there will be preservation of convergence and of vertical movements. We may then consider the abducens nucleus to be the center of associated lateral movements of the eyes to the same side; the posterior longitudinal bundle, the tract by which efferent stimuli from the abducens nucleus go to the oculo-motor nucleus of the same side; and this oculo-motor nucleus the origin of the fibers to the opposite internal rectus.

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DISCUSSION (*Abstract*)

Papers of Dr. Wagner and Dr. Davis.

Dr. John T. Crebbin, Shreveport, La.—As Dr. Davis pointed out, choked disc is a symptom which may be present very early or late. If possible we should make an effort to recognize this condition before this symptom appears. Furthermore, the headache of chronic sphenoiditis is usually located in the occipital region, although it may be above and posterior to the ears or at the top of the head.

The history is most essential in brain tumors.

A patient with an attack of sphenoiditis may be relieved by treatment, but brain tumors are seldom relieved by ordinary measures. I personally envy the man who is able to locate a brain tumor, and to tell whether we are dealing with a tumor or an attack of sphenoiditis.

The Granger line, although a wonderful adjunct in sphenoiditis, is not infallible. One should consider all the symptoms.

Dr. Homer Dupuy, New Orleans, La.—Many viewpoints and varied diagnostic approaches are necessary in differentiating brain tumor from sphenoiditis. Help from radiology, and neurology, must be sought if we are to unravel the problems under discussion. As to choked disc, let us bear in mind that any factor which induces intracranial pressure can cause these eye changes on one side, or on both sides. It is, therefore, in itself, not a specific differentiating sign in the two lesions. It must be considered, and proper valuation must be placed upon it. We must add cerebral abscess as a possible cause of choked disc. I have certainly observed it. In one instance, a sixth nerve paralysis correctly argued deep-seated abscess in the region of the petrous bone tip.

Another pointing signal is not usually interpreted correctly. The sphenoid sinus we are just beginning to recognize is not infrequently the primary seat of disease. Its anatomical situation makes it give signals of distress not easy to interpret. We are thus apt to diagnose tumor when there is sinusitis, or vice versa, or both may co-exist without relationship.

We cannot ignore the work of Dr. Earle Brown, of New Orleans, who, plausibly, stresses a contraction of the visual field, both as to form and color, in chronic sphenoiditis. If this be true, may not these abnormalities of vision give us dependable aid in the more refined methods we must necessarily apply in solving the difficult problem which will most certainly present itself to one of us some day? The patient suffering with pain in the head will sooner or later gravitate to an eye, ear, nose, and throat specialist, who will, therefore, be first burdened with the responsibility of giving momentum to a series of examinations which should finally clinch the diagnosis.

Dr. R. E. Semmes, Memphis, Tenn.—Papilledema is an indication of intracranial pressure. The work of Parker and others demonstrating the mechanical production of choked discs helped greatly to clarify the meaning of this effect. The difficulty and misunderstanding in distinguishing sphenoidal disease from brain tumor is now a thing of the past.

Examinations of the visual fields frequently give us accurate localizing data in tumors involving the occipital, temporal and chiasmal regions. There is one source of error which I wish to emphasize, that is: where there is choking of the discs the deformities found on the visual field chart are unreliable and apt to be misleading, and even in optic atrophy due to direct pressure on the optic nerves the different susceptibility of some of the nerve fibers gives an inaccurate picture. In the region of the optic nerves and chiasm the field is so small that these differences are of no practical significance from the standpoint of surgical approach. However, they are interesting in the light of researches by Gasser and others upon the differences in electrical conductivity of different nerve fibers and the susceptibility of nerve fibers of different kinds and sizes to mechanical and chemical damage. Notwithstanding the possibility of error, the eye findings in cases of brain tumor are second only to ventriculograms in importance as an aid to diagnosis.

The signs and symptoms of brain abscess are frequently so similar to those of tumor that it is impossible to distinguish between the two conditions, and we are forced to rely upon the presence of a suppurating ear or sinus to point to the probability of an abscess. From the neurosurgical standpoint it is of vital importance to know whether an abscess is present because the large osteoplastic flaps which are used in tumor cases are almost certain to spread the infection and are in addition an unnecessary hardship on the sick patient. The extensive exposure is as undesirable in an abscess as it is essential where a tumor is to be found and removed. Where an abscess is suspected it may be found or its presence ruled out by passing a blunt pointed needle through a small perforation opening, and it may be effectively evacuated or drained through the same opening after adhesions have been produced. However, that it is possible with the new electrosurgical methods to remove a chronic abscess with its wall was recently demonstrated by Cushing when he came unexpectedly upon a large abscess.

Dr. Adolph O. Pfingst, Louisville, Ky.—In many cases the oculist is the first to uncover symptoms suggestive of brain tumor, either as an accidental finding in cases undergoing a routine eye examination, or as the result of an ocular examination made at the instance of men in other departments of medicine. Improved methods of examination enable the ophthalmologist to find symptoms of brain tumor earlier than formerly and thus to bring cases to operation earlier. For our greater care in examination of cases of suspected brain tumor we are in a measure indebted to the advent of the neurosurgeon. Most of the larger medical centers now have a disciple of Dr. Cushing or Dr. Frazier, the pioneers in this special work. These men are doing splendid work and are stimulating the ophthalmologist to do more careful work in visual field measurements and fundus studies. If we can send cases of brain tumor to the

surgeon early we can reduce the mortality rate in surgical cases and we can preserve the vision in a greater number of cases.

About 80 per cent of all cases of bilateral papilledema are due to brain tumor, and all but about 10 per cent of brain tumors manifest themselves in papilledema. Hence the importance of an ophthalmoscopic examination. As has been told us, edema of the nerve often occurs early and it may be recognized first by a filling up of the physiological cup of the nerve and by a slight blur of the outlines of the nerve, especially on the nasal side.

Visual disturbance may be one of the early signs of brain tumor, but as the amblyopia is usually in keeping with the amount of changes in the optic nerves, the visual test is not frequently of value as an early diagnostic sign. In fact, I have seen cases of marked papilledema with practically perfect central vision. It is in cases of delayed diagnosis that there is great danger of secondary atrophy of the nerve. Slow-growing tumors, unrecognized on account of obscure symptoms, have been followed by secondary atrophy and blindness, as have cases of internal hydrocephalus (serous meningitis) while awaiting localizing symptoms, and gummata, in which decompression was delayed in order to administer anti-luetic treatments. In such cases studies of the visual fields are of great importance. While about half of the cases of brain tumor are sooner or later associated with concentric constriction of the fields, this is unfortunately as a rule not an early sign, as it comes on usually with nerve head changes. The same is true of the enlarged blind spot, which is usually in keeping with the amount of papilledema, and hence is not classed with the early signs of intracranial pressure. Scotomata are more frequently seen as an early symptom. You are all familiar with the temporal slant followed by bitemporal hemianopsia often occurring in hypophyseal tumors before other signs of such growths manifest themselves. Involvement along the visual paths behind the commissure involving the optic tract, the primary center or the radiation, may bring about homonymous hemianopsia early. These symptoms are of special value in indicating the location of neoplasms.

Not infrequently brain tumors are associated with paralysis of some of the crainial nerves, especially the third, fourth and sixth. If the palsies are bilateral they are usually the result of general increased intracranial pressure; if unilateral they are more apt to be due to pressure of a basilar tumor on one or more of the ocular nerves or the centers. Cerebellar growths are frequently associated with nystagmus. Hence nystagmus is looked upon as an important aid in localization.

Bilateral exophthalmos of low degree is present in about 10 per cent of brain tumors. Hence it furnishes an additional ocular diagnostic sign of intracranial neoplasms.

The study of the pupils, usually of much diagnostic value in affections of the nervous system, is of little value as an early diagnostic sign in brain tumor.

Dr. Meyer Weiner, St. Louis, Mo.—I appreciate especially the fact that Dr. Davis has emphasized the importance of careful recording of the fields. It is not alone careful measuring of the fields, but careful recording of the fields, that is of value.

One thing he did not mention that I am sure he does not neglect, and that is to record carefully the fundus observations and findings. The internist may examine the chest or abdomen and record that he finds everything normal, but to the ophthalmologist a record of "normal fundus" is entirely unsatisfactory. We cannot note the progress that has been made unless we record our findings in detail, because two or three days later unless we have a detailed record we cannot recognize the changes: whether there has been an increase in hemorrhage, in edema of the margins, or exudates.

I believe we do not pay enough attention to the symptoms of our patients. I will give one illustration. A patient came in complaining of poor vision to one of my friends. His vision was found to be normal, as were the fundi and peripheries. Neither the Peter nor the Lloyd campimeter showed any abnormality. Whenever a patient complains of poor vision there is something back of it. The fields were taken against a screen, and one does not need an elaborate apparatus to do this. They can be taken against a blackboard or against black paint on a glass door. Paracentral scotoma was found so small that it could not be recorded with a Peter's apparatus. The man a year later died of cerebral apoplexy, but he was warned and had made arrangements accordingly.

It is important that we take nothing for granted, but pay attention to the symptoms of the patient.

Dr. R. G. Reaves, Knoxville, Tenn.—I reported before the meeting of the American Medical Association in June, a case of bilateral choked disc, with paralysis of the left sixth nerve, caused by chronic sinusitis involving the sphenoids. A complete intranasal sinus operation was done. The ethmoids, sphenoids, frontal and maxillary were opened.

About three days after the operation the paralysis of the left sixth nerve began to recede, and the nerve soon returned to normal. The visual acuity some time after the operation returned to 20/20 minus. There is today some atrophy of the nerve. The patient had almost complete recovery with a good nose, very little discharge, and very good sense of smell. The ophthalmologist who first saw this case thought of nothing but brain tumor.

Dr. John A. Foote, Washington, D. C.—I am speaking from the standpoint of the pediatrician. The skull of the child is very plastic and large in proportion to the rest of the body, even at six or seven years, and because of that greater capacity those symptoms which are pressure symptoms are minimized in the child. You may have a considerable degree of intracranial pressure in a child without external manifestations, and even the classical symptoms of vomiting and headache, which come first, do not appear early. Headache when it appears is nearly always a symptom of acute infection. Chronic headache in a young child is a very suspicious circumstance if there is no accompanying fever. Sometimes during an acute infection with a little intracranial pressure the headache will become intense and you will have projectile vomiting. That is always a suggestive symptom. Do not be misled when it tends to recur, and call the condition acidosis or cyclic vomiting.

Nearly all these tumors in children have a grave prognosis; in infancy the prognosis is very bad. Most brain tumors in the child are infratentorial, which means that the earlier symptom is pressure on the brain stem, and that pressure produces hydrocephalus. Hydrocephalus may be present in the child, but examination of the eyegrounds shows little in the early ages. You will find perhaps a slight blurring of the disc, or some increased tortuosity of the vessels, but if in addition an x-ray picture is taken of the skull, you will find a little separa-

tion of the sutures, a little marbling of the frontal bone even at the later ages, and these findings, plus a history of projectile vomiting, should tell you that you are dealing with a brain tumor, even though classical eye symptoms have not appeared.

Dr. Wagner (closing).—It was my desire to call to mind the fact that some patients with signs and symptoms suggestive of intracranial and sphenoidal abnormality are operated upon for sinusitis when in reality the symptoms are due to intracranial lesions. Dr. Davis brought out one sign not mentioned in my paper, the interlacing of color fields. This is sometimes found on examination of a patient in whom sphenoiditis is suspected; but it is not indicative of it. It is usually indicative of hysteria.

In the part of my paper that I did not read I mentioned these tumors with focalizing signs and symptoms into which class brain abscess would most probably belong.

Dr. Semmes mentioned choked disc. "Choked disc is an early symptom in posterior fossa tumors," to quote Cushing; so is choked labyrinth. Of the two I think choked labyrinth is more important in the differential diagnosis. We know that obstruction of the venous return from the labyrinth, obstruction of the auditory vein, the vestibular or even the cochlear vein, will produce choked labyrinth. We know that the anatomy of the entrance of the nerve is similar to that of the optic nerve. We know that the labyrinth, particularly the perilymph space, communicates with the subarachnoid space through the aqueductus cochlearis, consequently these three factors are important in choked labyrinth.

Dr. Davis (closing).—Many brain tumors go unrecognized until the late symptoms make their appearance. Choked disc, severe headache, and vomiting are late symptoms. The condition should be recognized before they appear.

One point mentioned by Dr. Pfingst, that the neuro-surgeon has been keener in this work of visual field study than the ophthalmologist, is perfectly true and we ought to be ashamed of it. We should have taken the lead, not have to be led by the neuro-surgeon. Cushing and others drew the attention of the medical profession to the extreme importance of this study of the visual fields before we laid any great stress on it ourselves. It is only now that we are coming to a thorough understanding of its importance.

Dr. Weiner mentioned that elaborate apparatus is not necessary. That is true. It need not be elaborate. The case mentioned shows the importance of a study of these cases with a screen. One cannot find small bilateral changes any other way. The perimeter does not give a sufficient magnification to pick up small central and paracentral scotomas which are important. The Bjerrum screen is just a blackboard, but you can record from it. The important thing is the record, and the important thing about using a screen is, that if you use an ordinary blackboard you do not get a record, whereas if you use the Bjerrum screen you have an accurate record of these patients which gives you information you will not get in any other way.

Dr. Foote brought out some important points in regard to children.

About the diagnosis of brain lesions not necessarily brain tumors, papilledema means increased intracranial pressure and is usually due to internal hydrocephalus. Very often in pituitary tumors there is no papilledema because the pressure comes on the optic nerve sheath and so prevents it. But in order to make an early diagnosis we must have the visual field changes, we must have a record, we must have the neurologist or the neuro-surgeon in these difficult cases. The ophthalmologist should observe the field changes first. We should not be led to them by the neuro-surgeon.

PERENNIAL HAY FEVER: DIAGNOSIS AND TREATMENT, BASED ON THE STUDY OF FOUR HUNDRED AND FORTY-ONE CASES*

By RAY M. BALYEAT, M.A., M.D., F.A.C.P., Oklahoma City, Okla.

Asthma and seasonal hay fever are two allergic syndromes that have long held the interest of those working in the field of allergy. There is an allied condition, however, of no less importance, that has received much less attention from the allergist, and frequently is unrecognized by the general practitioner and nose and throat specialist. It is manifested clinically by a train of symptoms relative to the upper respiratory tract and the eye, due to a general hypersensitive state, but the onset and disappearance of symptoms are not so dramatic as are seen in either asthma or seasonal hay fever. The terms "rose cold," "vasomotor rhinitis," "hyperesthetic rhinitis," "atopic corya," and "perennial hay fever," have been applied to it. The writer prefers to use the term "perennial hay fever," as it is probably the most descriptive. In a recent study[1] of one thousand cases of allergy it was pointed out by the writer that orris root is a very important factor in the cause of perennial hay fever, but by no means is it the only one.

The present study is undertaken with an idea of pointing out the differences in symptomatology between this type of hay fever and the seasonal one; to discuss the various etiologic factors; to offer methods of overcoming difficulties in diagnosis; and to suggest practical methods of management. This work is based on the study of 441 cases of perennial hay fever, of which 170, or 38.5 per cent, were uncomplicated cases; 157, or 35.6 per cent, were primarily perennial hay fever cases complicated with asthma, and in 114, or 25.8 per cent, asthma was the predominating feature, but a definite perennial hay fever condition existed.

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*Read in Section on Medicine, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

SYMPTOMS OF SEASONAL AND PERENNIAL HAY FEVER

The peculiar and startling suddenness with which seasonal hay fever usually begins and the dramatic cessation of symptoms with frost, in many instances will distinguish it from the perennial type. Patients suffering from the latter type of hay fever seldom have symptoms confined to a definite time of the year, and therefore it is frequently unrecognized as such, but mistaken for primary nasal disease. However, there are exceptions to the rule.

A merchant described his symptoms as occurring at a certain time in the spring when the cottonwood tree is pollinating. However, on testing him, a sensitivity to the pollen was not found, but to one of the animal epithelia, namely, dog hair. On re-questioning he admitted that the period over which his symptoms extended each spring coincided with his spring vacation, during which time he always helped with cleaning out the dog kennels, and would work with his dogs a great deal.

A large per cent of the seasonal hay fever patients have no symptoms after frost. Here again, there are exceptional cases sensitive to pollen only who have mild symptoms at any time during the winter, due, in the writer's judgment, to the pollen-laden dust with which they come in contact in any home. Seasonal hay fever patients complain of one or all of the following symptoms:

(1) Itching and lacrimating eyes.

(2) Itching and congested nose.

(3) Itching of the roof of the mouth and posterior pharynx.

(4) Itching and congestion of the eustachian tubes.

(5) Band-like headaches.

(6) General depression.

Eye signs are usually present and a prominent symptom. Itching of the mucous membrane of the eye or upper respiratory tract has been present in every case of seasonal hay fever studied in our Clinic. It is frequently a very disturbing symptom. The difficulty in recognizing perennial hay fever as allergic cases frequently arises from the fact that the symptoms may be mild and of short duration, or if the symptoms are constant, the explosive sneezing, the marked nasal blocking, the copious mucus from the nose, and the lacrimating eyes, are not present. Many cases complain of a mild head cold all the time, with some itching of the nose, but without eye signs. Others complain of very slight congestion of the nose, with eye signs most prominent. The following cases illustrate the two types of cases mentioned.

Case 1.—E. C. M., a woman, age 32, had suffered from lacrimating eyes in a modearte degree for three years. She complained of slight itching of the inner canthus of the eye and also had a mild congestion of the mucous membrane of the nose, at times with some itching of the nasal mucous membrane. She was advised by a competent eye specialist to be fitted with glasses, although he told her he found no special eye defect. She soon learned that wearing glasses did not change the symptoms of which she complained. Two other oculists were consulted, and each fitted her with a pair of glasses, but without giving her relief.

Intradermal testing showed a four plus reaction to orris root, but a reaction to no other atopic substance.

Changing her cosmetics to non-orris root ones and desensitizing relieved her of the lacrimating eyes and the congested nose.

Case 2.—Mrs. H. H. S., a woman of 44, gave a history of aching and itching in the posterior pharynx of four years' duration. On close questioning there was elicited very slight itching in the inner canthus of the eye and slight congestion of the nose, with mild itching of the eustachian tubes. The symptom which was prominent, and the one bothering her most, was the one relative to the posterior pharynx. This patient was referred by a competent nose and throat specialist who had treated her throat over a period of four years with no apparent change in her condition. He reported the paranasal sinuses normal, and the mucous membrane of the nose and posterior pharynx in perfect condition.

Skin tests proved entirely negative to food, animal epithelia and pollen protein. Intradermal testing gave a three plus reaction to chicken feathers and two plus reaction to orris root.

Eliminating feathers from her bedroom and desensitizing to orris root has given this woman complete freedom from her symptoms.

The first case reported illustrates the type whose symptoms are primarily eye, while the second case is one which complained of an irritable and itching throat, without eye signs.

A PATHOGNOMONIC SYMPTOM

Of the 441 perennial hay fever cases we have studied, none was found on whom we could demonstrate a hypersensitive condition by either the dermal or intradermal method, who did not give on close questioning a very definite history of itching of the mucous membranes of either the eye, nose, roof of the mouth, posterior pharynx, or eustachian tubes. Many cases have been sent to the Clinic with a question of perennial hay fever, who gave no history of itching of the mucous membrane of the structures just mentioned, and in none of these were we able to demonstrate definite evidence of a specific sensitivity by the dermal or intradermal method. We have yet to observe a typical seasonal hay fever patient from whom we could not elicit a definite history of itching of the mucous membranes of the upper respiratory tract or eye, and usually

the sign is a prominent one. We have on record nine asthmatic cases who complained of itching of the skin in the upper intrascapular region which could not be relieved by scratching. At our suggestion, they found that this trying symptom was relieved by pressure. The itching just referred to is evidence of a viscerosensory reflex from an irritation of the mucous membrane of the bronchial tree by the pollen or animal dander to which the patient is sensitive. It appears from our study of the histories of 1700 allergic cases that itching of the mucous membranes of the eye, upper respiratory tract or the bronchial tree, is a pathognomonic symptom of a specific sensitivity to some atopen.

A history of the symptom of itching of the mucous membranes is important from a practical standpoint. If the general practitioner or the nose and throat specialist would be very careful in questioning his patient concerning this symptom, perennial hay fever would much less often be mistaken for primary nasal disease. From our study it appears that when the symptom is present careful study from an allergic standpoint is always justified. Physicians should keep in mind that the itching referred to is not an uncomfortable feeling in the nose or inner canthus of the eye which may be due to purulent secretions, but a definite unquestionable itching. There should never be any question in the cases who give a history of itching in the roof of the mouth, as probably no other condition than hypersensitiveness to some atopen can produce it. No one can explain the difference between the true itching referred to above and the irritation from purulent secretions better than an allergic patient who suffers from hay fever of some type.

ETIOLOGIC FACTORS

The etiologic factors in perennial hay fever are of two types, namely, substances which cause symptoms by inhalation, such as wheat flour dust, orris root, insecticides, snuff, animal emanations of all kinds, pollen, house dust, and occupational dust; and those which cause symptoms by ingestion, which can be any food taken by the patient, and occasionally drugs.

After studying the skin tests of the 441 cases of perennial hay fever, along with the clinical symptoms, animal dander, either one or more, was considered the chief factor in 67, or 15.1 per cent, of the cases, and a definite secondary factor in 233, or 52.8 per cent. The specific hypersensitiveness is not inherited,[2] but patients are born only with the ability to become sensitive, and it is natural for them to become sensitive to those things that they come in contact with in massive doses. It is little wonder, then, that the percentage of perennial hay fever patients who are sensitive to animal dander and whose symptoms, clinically, come from contact with animal dander, should be high, since it is a rare individual who from babyhood to the grave does not spend from six to eight hours daily in intimate contact with feather dust. Most women and children are in almost constant contact with house dust, which is a combination of feathers, horse hair, cat hair, dog hair, rabbit hair, and goat hair. Many mothers who live in cities have difficulty in understanding how their children, or they themselves, could come in contact with the animals just mentioned. They do not realize that their overstuffed furniture, which they prize so highly, and in some cases, mattresses, represent a menagerie. Spain[3] considers animal epithelia an important factor in the cause of perennial hay fever (atopic coryza).

Pollen was found to be the chief factor in 20 cases, or 4.5 per cent, and a secondary one in 240, or 54.4 per cent. In those cases in which it was the chief factor, there were other factors, such as animal dander, or orris root, and the reason why it was considered the chief factor is that when these patients were thoroughly desensitized to the pollen to which they were found sensitive, their mucous membranes would then withstand living under the same conditions under which they had previously lived with freedom from symptoms. Pollen was considered a secondary factor in the 240 cases because they were found definitely sensitive to one or more pollens from plants that were abundant in the territory in which they lived, and which, clinically, appeared to increase their symptoms during the pollinating season. If pollen was a secondary factor in 54.4 per cent, and a primary factor in 4.5 per cent, it appears that pollen is a very important factor in perennial hay fever. Now, of course these figures will not hold true in the North and Northeast, where the pollen content of the air is not so great as in the South.[4] In the South and West the windows of the average home are thrown open most of the time from early spring until late fall, and the wind blows frequently at a velocity of from nine to fifteen miles an hour many days in succession, which naturally saturates the home with pollen,

and this means the house and its contents are saturated with pollen which remains perfectly dry, and therefore does not deteriorate. After frost, therefore, patients who are extremely sensitive to pollen, will frequently have symptoms throughout the entire year, due, in the author's judgment, to the pollen-laden dust of the home.

We have found food to be not an uncommon cause of nasal symptoms. This has been observed by Eyermann,[5] who reported a number of cases of nasal symptoms due entirely or in part to food. Vaughan[6] reported a series of cases of primarily pollen hay fever whose symptoms were accentuated by certain foods to which they were sensitive. Spain[3] states that atopic coryza, due to food, is relatively rare compared with inhalants as a causative factor, but does exist. Of our series under present consideration, 107, or 24.2 per cent, were found definitely sensitive to food. Of this number, 22, or 4.9 per cent, gave clinical evidence from history that food was a very definite secondary factor. In many other cases, in all probability, the ingestion of foods to which they were sensitive played a very definite part as a predisposing factor. For this reason it is the writer's judgment that in these cases any food to which the patient is found specifically sensitive should be eliminated from the diet, or limited to a large extent. Of the foods to which patients were hypersensitive wheat was by far the most common. Four of our cases clinically would have their hay fever

COMPARATIVE IMPORTANCE OF CAUSATIVE FACTORS IN 441 CASES OF PERENNIAL HAY FEVER

	Chief Factor		Secondary Factor	
	No.	Per cent	No.	Per cent
Animal dander	67	15.1	233	52.8
Pollen	20	4.5	240	54.4
Food	22	4.9	107	24.2
Orris root	53	12.0	27	6.1
House dust	....	.....	143	32.4

Miscellaneous: any inhalant, such as snuff, deer hair, flaxseed, castor bean dust, dust from June flies, ipecac, dust from vanilla beans, etc.

symptoms increased materially and rather suddenly by eating celery, and three of the cases noticed the same increase of symptoms on the ingestion of watermelon.

Orris root was found to be the chief factor in 53, or 12.0 per cent, and a contributing factor in 27, or 6.1 per cent. In 16, or 3.6 per cent, it was considered the sole factor. In this series were many cases complicated with asthma, which makes the percentage of orris root as a chief factor rather low. In a previous study of 82 uncomplicated perennial hay fever cases the writer[1] showed that orris root was the sole cause or a contributing factor in 47.5 per cent. Any product that is either the sole cause or the chief factor in such a large per cent of cases deserves careful consideration.

House dust was found definitely positive in 143, or 32.4 per cent. It has been suggested by some very good authorities that there may be an atopic substance in house dust that is peculiar to house dust itself, to which patients may become hypersensitive. In this series we found none who were definitely sensitive to house dust who were not sensitive either to some inhalant such as orris root, animal epithelia, pollen, or a combination of these atopens, which is at least suggestive of the fact that the reaction to house dust is nothing more than a reaction to one of the atopic substances just named.

An individual born with the ability to become sensitive may become specifically sensitive to any one of many inhalants. For example, one case in our series was found definitely sensitive to pyrethrum, both clinically and on testing.

One patient came to the Clinic complaining of perennial hay fever complicated with asthma. In him much difficulty was encountered in finding the positive factor. On returning for a second examination a few months later he reported that he believed that snuff might be the cause of his symptoms, and that his wife was a user of snuff. On first checking we had obtained a reaction to tobacco but paid little attention to it, but on testing him the second time a box of snuff was opened for the purpose of using it in testing, and almost immediately marked nasal symptoms were encountered.

Recently we have seen an unusual case of both perennial hay fever and asthma in a trapper, who would have violent attacks of coryza associated with urticaria of the face and hands whenever he worked with deer. On testing one case of perennial hay fever we found a marked reaction to the Australian opossum, which is a very unusual finding, and on questioning she reported that she had an Australian opossum fur coat. Clinically, her symptoms were worse on handling or wearing this coat. Two of our cases proved definitely sensitive, both on skin tests and clinically, to monkey hair, and both patients had pet monkeys which they had brought from Central America.

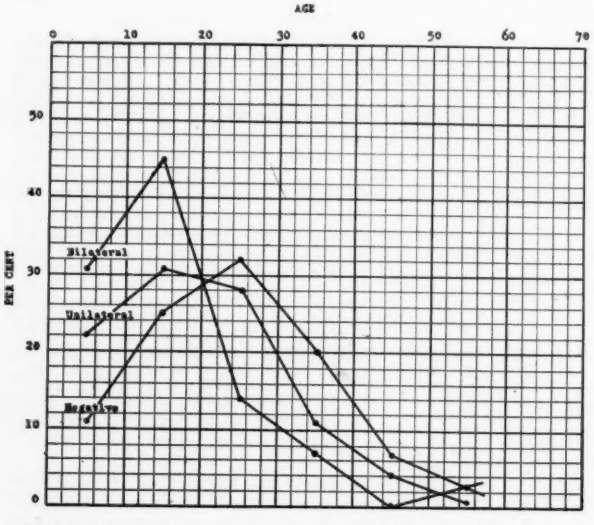
One case was found whose symptoms were very much increased on working with flaxseed, and skin testing proved a definite sensitivity to it. Figley and Elrod[7] report a most interesting series of cases who were sensitive to castor bean dust, and relate some other cases[8] sensitive to the dust of June flies.

Drugs may cause an increase in nasal symptoms by either inhalation or ingestion. Peshkin[9] reported a number of cases of asthma who had

nasal symptoms following the inhalation of a number of drugs, such as ipecac, podophyllin, dust from vanilla beans, and emetin. Spain[10] reports nasal symptoms due to aspirin and quinin. We have one patient, a druggist, who had perennial hay fever, the chief factor being powdered ipecac by inhalation. Several of our cases have suggested that their symptoms were increased on ingesting aspirin, and some of them also reported hives appearing at the same time. One of our cases did not give a history of difficulty in taking aspirin and it was prescribed by the writer for a severe headache. It produced such marked symptoms of both nasal congestion and asthma that for a while her condition appeared serious.

MULTIPLE SENSITIVITY

In 80 cases, or 18.1 per cent, were patients sensitive to only one group of atopic substances, and in 160, or 36.2 per cent, were they sensitive to just two atopic groups. All others were sensitive to more than two. It appears, therefore, that multiple sensitivity is the rule in perennial hay fever cases, as is also true in asthma.[2] From our records also there is definite evidence that the earlier the individual develops a sensitivity, the greater is the tendency to develop a specific sensitivity to a large number of atopic substances. Therefore, multiple sensitivity should be the rule, especially in those cases whose symptoms appear early in life. In other words, individuals born into the world with the ability to become sensitive should become sensitive to more than one protein, and they usually do.



Distribution of age of onset of clinical manifestations in perennial hay fever cases of all ages.

PART PLAYED BY PARANASAL INFECTIONS

Chronic nasal and paranasal sinus infections are a fairly common finding in perennial hay fever. Of our series all patients had either had a nasal examination by a competent rhinologist or were examined by one during our study. Twenty-eight cases, or 6.3 per cent, had chronic infections of the antrum, sphenoid or ethmoid cells, or the frontal sinuses. In no case, so far as we could detect from history, did the symptom of hay fever follow an acute paranasal infection which became chronic. This leads us to believe that the chronic infection is only coincident with the hypersensitive state and has little influence on the symptoms. An infected sinus or antrum that is draining will naturally have a tendency to intensify the susceptibility of the hypersensitive membrane to the irritating substances, and therefore if properly treated will be a help in the management of a case of true perennial hay fever. Instead of infections being the cause of hay fever symptoms, perennial hay fever is frequently an indirect cause of the infection of the paranasal cavities, since chronic congestion of the nose interferes with drainage if the cavities become infected. Twelve of our series had polypi present on our initial examination, and eight others gave a history of having had polypi removed. The question naturally arises as to why polypi are common in the cases of perennial hay fever. It seems logical to the writer to believe that polypi may be formed in the same way that stalactites of caves are formed: the constant waterlogging of the nasal membrane allows the gelatin-like bodies to develop.

PART PLAYED BY THE HEREDITARY FACTOR

In a recent study of 1000 cases of allergy[11] the writer showed that a positive family history of allergy could be obtained in 60.1 per cent of all clinically hypersensitive cases, while in a study of 1117 normal university students a positive family history was found only in 8.3

per cent, which is a marked contrast to 60.1 per cent. The presence of seasonal hay fever, perennial hay fever, asthma, migraine, or eczema, in the family history, would always suggest the probability of a hypersensitiveness in a patient in whom there is a question of one of these conditions. Especially is this true if the familial history is great.

The writer has pointed out in a previous paper[2] that the more complete the familial tendency the earlier the onset of symptoms. In other words, an individual may be destined by heredity to develop symptoms of allergy at an early age in life. It was also shown that inheritance appears to be the chief factor in determining whether or not an individual will ever develop an allergic condition.

In our present study of 441 cases of perennial hay fever, 29, or 6.6 per cent, gave a bilateral family history; 240, or 54.4 per cent, a unilateral family history, and 172, or 39 per cent, gave a negative history of allergy in the family. The graph on opposite page shows the distribution of age of onset of clinical manifestations in perennial hay fever cases of all ages. It is of interest to note that a greater per cent of the cases of perennial hay fever with a negative family history, or with either a unilateral or bilateral family history, developed symptoms in the second and third decades than any other time in life. This differs rather materially from a similar study[12] made on the distribution of ages of onset of asthma and hay fever cases of all ages, which showed a larger per cent developed in the first decade than any other one. Especially was this true in cases who gave a bilateral family history. The fact that 61 per cent of all cases studied had a definite familial history of allergy, which is a greater per cent than is found in asthma and seasonal hay fever, is additional evidence that perennial hay fever has as a basis a hypersensitiveness to some atopic substance.

RELATION BETWEEN PERENNIAL HAY FEVER, SEASONAL HAY FEVER, ASTHMA, ECZEMA, AND MIGRAINE

Three family trees are being offered as a means of showing the relation between perennial hay fever, seasonal hay fever, asthma, eczema, and migraine.

In the pedigree, as is shown in *Chart 1*, one will notice that a migraine grandmother on one side of the family gave birth to two sons and one daughter with migraine, and a daughter and son without any allergic history. One of these sons married a woman with migraine, and from this union there were five sons and two daughters. One daughter had asthma and perennial hay fever, one daughter had no allergic history, two sons had migraine, one of whom had perennial hay fever, and another son had straight perennial hay fever.

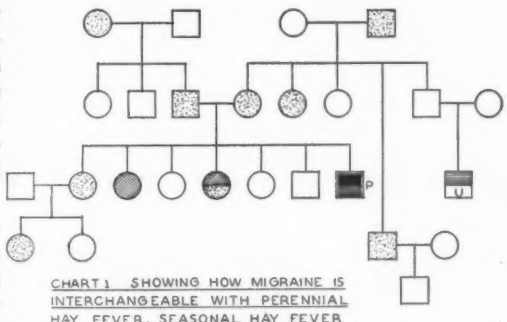


CHART 1 SHOWING HOW MIGRAINE IS INTERCHANGEABLE WITH PERENNIAL HAY FEVER, SEASONAL HAY FEVER AND ASTHMA IN THE LINKAGE

It appears from this family tree that migraine and perennial hay fever are interchangeable in the linkage.

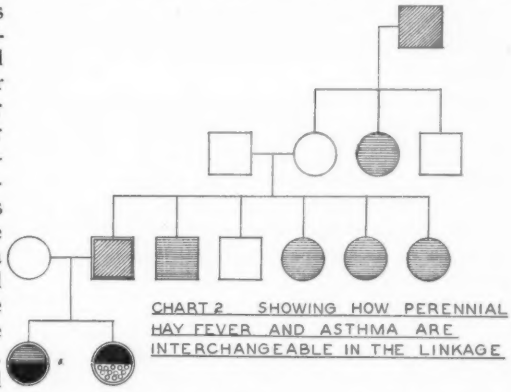


CHART 2 SHOWING HOW PERENNIAL HAY FEVER AND ASTHMA ARE INTERCHANGEABLE IN THE LINKAGE

Chart 2 illustrates a family tree in which a perennial hay fever grandmother gave birth to two sons and one daughter, one of the sons having seasonal hay fever and one son having asthma. The asthmatic son married a woman without an allergic history, and from the union there are three sons and one daughter with seasonal hay fever, one daughter without an allergic history, and one daughter with perennial hay fever. The perennial hay fever case, who is a patient of ours, gave birth to two sons, one with asthma and eczema, and another son has perennial hay fever and eczema.

From this series it appears that asthma and perennial hay fever are interchangeable in the linkage.

In *Chart 3* we find a grandmother with eczema, who gave birth to a daughter with eczema, who in turn gives birth to five sons and one daughter. Two sons and one daughter have no allergic history, one son has seasonal hay fever and eczema, one son eczema only, and another son has perennial hay fever and eczema.

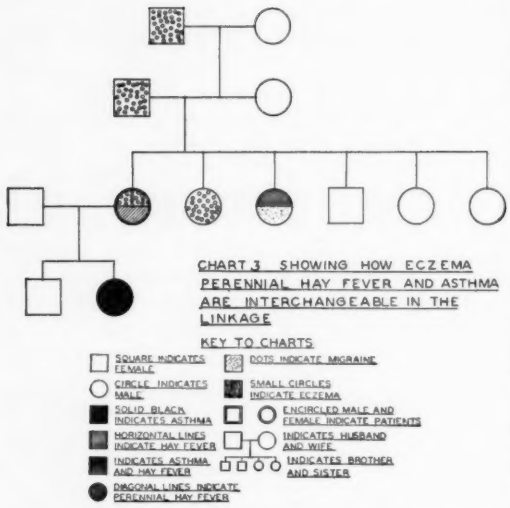


CHART 3 SHOWING HOW ECZEMA PERENNIAL HAY FEVER AND ASTHMA ARE INTERCHANGEABLE IN THE LINKAGE
KEY TO CHARTS
SQUARE INDICATES FEMALE
CIRCLE INDICATES MALE
SOLID BLACK INDICATES ASTHMA
HORIZONTAL LINES INDICATE HAY FEVER
INDICATES ASTHMA AND HAY FEVER
DIAGONAL LINES INDICATE PERENNIAL HAY FEVER
DOTS INDICATE MIGRAINE
SMALL CIRCLES INDICATE ECZEMA
ENCIRCLED MALE AND FEMALE INDICATE PATIENTS
INDICATES HUSBAND AND WIFE
INDICATES BROTHER AND SISTER

The son with perennial hay fever and eczema marries a non-allergic woman, who gives birth to a son with asthma.

It appears from this pedigree that eczema and perennial hay fever are interchangeable in the linkage.

From the three cases presented, and other similar cases, we are led to believe that perennial hay fever, seasonal hay fever, eczema and migraine are interchangeable in the linkage. If this be true, and it appears so from our findings, it is additional evidence that perennial hay fever is based on a specific hypersensitiveness to an atopic substance.

GENERAL HEALTH

In a previous study of 1217 allergic patients,[11] it was pointed out that aside from their hypersensitive condition 74.9 per cent had general health above normal, 17.8 per cent had normal health, and only 7.2 per cent were below normal. Of the 441 perennial hay fever cases under consideration, 425, or 96.3 per cent, gave a history of general health above normal; 13, or 2.9 per cent, were normal, and only 3, or 0.7 per cent, were below normal. It appears, without any question, that perennial hay fever cases, as has been also previously found in asthma, seasonal hay fever, and eczema, have a general health that is far above the average. An answer to the question as to why a perennial hay fever patient, or one suffering from some other form of allergy, such as asthma or seasonal hay fever, should have a superior resistance against infectious diseases, is not an easy one, as has been suggested in a previous paper by the writer.[11] The writer has offered the following explanation as a possible answer:

> "An individual who inherits the ability to become specifically sensitive to cat hair, orris root, pollen, food protein, or some other atopen, certainly has a body that is made up of cells that are hyperirritable or hyperactive compared with the normal, since in many cases the atopic bodies are formed on first contact with the atopen. It is true that the formation of antibodies and atopic bodies are two separate and distinct processes; however, they are of a similar nature. If this be true, it would be logical, then, to believe that an individual whose cells develop atopic bodies with ease should also develop antibodies against pathogenic organisms with similar ease. Therefore, one born into the world with the ability to become sensitive to atopic bodies early in life should develop a larger number of specific anti-bodies against pathogenic organisms than a non-allergic individual, and thereby have greater resistance against diseases in general." Perennial hay fever people therefore would be above normal in general health, and it appears that they are.

COMPLICATIONS

Out of the series studied, 157, or 36.6 per cent, were complicated with asthma; 28, or 6.3 per cent, had hives associated with their perennial hay fever; 36, or 8.1 per cent, eczema; and 17, or 3.8 per cent, migraine. Those who had asthma complicating their hay fever developed their asthma subsequent to the onset of their hay fever symptoms, many of them several years after hay fever symptoms developed. From the figures it appears that asthma is a common complication of perennial hay fever. Some of the perennial hay fever cases had had from one to three nasal operations. Most of the operations had been removal of turbinates, and in several cases asthma appeared a short time following their removal.

NASAL SURGERY IN PERENNIAL HAY FEVER

Much needless surgery has been done in perennial hay fever cases during the past, and even today much more is being done than there should be. Tonsillectomy, turbinectomy, polypectomy, septum resections, antrum irrigation, upper sinus drainage and sphenopalatine ganglion injections are common procedures. Of those mentioned, the removal of turbinates is the most common. In certain cases, without question, some of these are indicated, but in no instances should the patient be promised relief. The removal of turbinates or polypi will give the patient a better opportunity to breathe, but the symptoms of itching of the eyes, nose and throat remain just

as disturbing. In a number of our cases asthma soon followed the removal of turbinates. For many years turbinates in perennial hay fever cases were removed by the best of the nose and throat specialists, as the actual cause of the swelling was not known. However, today the cause can be determined in a large per cent of these cases and for this reason the tendency to remove turbinates in perennial hay fever is much less than it once was, as it is realized that the removal frequently does more damage than good. When turbinates are removed in these patients, or any other patient, the structure which has much to do with warming, moistening and straining the air, has been destroyed, thereby increasing the tendency for patients to develop asthma. Infected paranasal sinuses that are draining poorly frequently need surgical interference. Polypi are probably always surgical and should be removed in these cases.

MENTAL ACTIVITY OF PERENNIAL HAY FEVER PATIENTS

In a recent study[11] of the hereditary factor in allergic diseases, the writer showed in a series of asthmatic children who were compared with non-allergic ones that the mental activity was far above the normal. The results showed that 70 per cent of the asthmatic children fell in the "superior," "very superior," or "genius" class, compared with 20 per cent of the non-allergic children who fell in this class, and a theory of explanation was offered. In our present study we have not obtained the intelligence quotient of a large number of the children with perennial hay fever, but a few in whom it has been obtained lead us to believe that the percentage who would fall in the superior or very superior class would be just as great as in our previous study.

DERMAL TESTS NOT SATISFACTORY

We have found the dermal test in seasonal hay fever to be quite satisfactory in about 90 per cent of the cases, but as a means of determining the etiologic factor in asthma and perennial hay fever the dermal test alone has not proved successful. Of the 441 cases studied there were 362, or 82.1 per cent, who gave a definite positive reaction, on intradermal testing, to one or more pollens, while only 207, or 46.9 per cent, reacted to pollen by the dermal method. There were 369, or 83.6 per cent, who reacted to animal dander by the intradermal method, compared with 104, or 23.5 per cent, by the dermal. One hundred twenty-six, or 28.5 per cent, showed a positive reaction to orris root by the intradermal method, compared with 44, or 9.9 per cent, with the dermal. The dermal method was not used in testing with house dust, but the intradermal method was used routinely in applying the house dust test and 143 cases, or 32.4 per cent, were found sensitive. Except for wheat, milk and eggs, the intradermal method was not used in food testing. There were 58, or 13.1 per cent, who were found sensitive to one or more of these three foods. One hundred seven, or 24.2 per cent, proved positive to some food by the dermal method.

From the figures just presented it appears that about 50 per cent of the perennial hay fever patients who are definitely sensitive to inhalants as shown by the intradermal method, did not give positive scratch tests. For this reason we use routinely in our work, not only in testing the perennial hay fever patient but also for those who suffer from asthma, the dermal method first, chiefly as a means of assuring us that we are not dealing with a very hypersensitive patient. After skin readings are made, the intradermal method is then used routinely in testing for all inhalants and part of the foods.

COMPARATIVE RESULTS OF DERMAL AND INTRADERMAL METHODS OF TESTING 441 PATIENTS WITH PERENNIAL HAY FEVER

	Dermal Method		Intradermal Method	
	No. of Cases	Per cent	No. of Cases	Per cent
Pollen	207	46.9	362	82.1
Animal dander	104	23.5	369	83.6
Orris root	44	9.9	126	28.5

TREATMENT

Three distinct measures must be used in the treatment of the average case of perennial hay fever: first, elimination; second, education; third, desensitization. In some cases, of course, education and elimination will suffice. For example, if a patient is sensitive to feathers and feathers only, in the case of a man, eliminating the feathers from his home and teaching him carefully how to keep away from them when he is traveling, will usually be sufficient to relieve him of his nasal symptoms. However, it has been our experience that in cases of women and children elimination of feathers from their home is not all that is necessary, but the third measure, namely, desensitization with a feather extract, must be used.

In some cases who are sensitive to orris root, if the sensitivity is not too great, a substitution

of non-orris root cosmetics by the patient and education concerning orris root contact, will relieve her of nasal symptoms, but a large per cent of the patients who are sensitive to orris root require the third measure, namely, desensitization with an orris root extract, for relief. Those who suffer from orris root sensitivity should be advised to use no face powders, body powders, bath salts, sachets or soaps, that are highly scented, and a list of the inoffensive ones should be given them. The process of desensitizing an orris root case is similar to the one used in patients who are sensitive to pollen, and the treatment in the majority of cases who require desensitizing is very satisfactory.

A sensitivity to a multiplicity of atopic substances is the rule in perennial hay fever cases. The percentage who are sensitive to one atopic substance is small. As has been previously shown in this paper, a large per cent are sensitive to pollen, which means that desensitizing with pollen or pollens to which they are sensitive, in a fairly large per cent, must be done if good results are hoped for.

In those patients whose symptoms are entirely due to food, thorough elimination of the offending food is all that is necessary, but in those cases whose symptoms are primarily due to an inhalant and secondarily to a food, elimination of the food also should be carefully done in conjunction with desensitization to the inhalant.

Of the 441 cases studied, excellent results were obtained in 80, or 18.1 per cent, good results in 270, or 61.2 per cent, fair results in 79, or 17.9 per cent, and poor results in 12, or 2.7 per cent. In our interpretation we considered excellent results obtained in those who received from 90 to 100 per cent relief, good results from 75 to 90 per cent, fair results from 40 to 75 per cent, and poor results in all under 40 per cent.

From the foregoing considerations it appears that perennial hay fever patients, aside from their hypersensitive mucous membranes, are far above the average in general health, and that, not unlike asthmatic children, their mental activity is more acute than the normal. We are led to conclude from our study that at least 80 per cent of patients suffering from perennial hay fever have been mis-diagnosed and treated for primary nasal disease or some other condition. Many of these patients have had much needless surgery done on them.

Perennial hay fever patients are frequently told by their physician that they have a little catarrhal condition which does not amount to much, and they are either told to forget it, or some local applications are used. Many physicians will assure them, if they recognize it as perennial hay fever, that very little can be done for it, and try to minimize the symptoms in the patient's mind, often feeling that the patient is only a neurotic. The question arises frequently, therefore, what can be done for a patient suffering from perennial hay fever, and can sufficient relief be obtained to justify treatment?

The writer wishes to call your attention to the fact that orthopedic surgeons spend years in correcting deformities due to nerve and bone disease, and the correction is usually only in part. Cardiologists are doing some wonderful and worthy work both in children and adults who have suffered from valve and muscle lesion by training them to protect their hearts. The urologist does much to lengthen the life of the chronic nephritic by patiently guiding him over a period of years. A careful study of the mentally deficient child, and the adult whose nervous system is below par, by the neuro-psychiatrist is worth while.

Many orthopedic, and a large per cent of the chronic cardiac, nephritic and mental cases, will always be far below par in spite of the efforts of the skilled surgeon and physician, yet treatment over a period of years, if necessary for even partial relief, is justified. Today, with few exceptions, results in the treatment of perennial hay fever and asthma are more satisfactory than the treatment of any other chronic disease. Protecting the perennial hay fever patient from his symptoms is frequently the prevention of asthma. A perennial hay fever patient or an asthmatic relieved of symptoms, differing from patients suffering from other chronic diseases, is usually above normal both physically and mentally. Therefore, if the treatment of the other chronic diseases is worth while, and it is, although the outlook is frequently not bright, how much more are we justified in a careful study and treatment of the perennial hay fever patient, over a period of years if necessary, for relief or cure.

CONCLUSIONS

(1) Symptoms of perennial hay fever are frequently not prominent, compared with those of the seasonal type.

(2) Itching is a sign that is probably never absent in perennial hay fever, and therefore

might be considered a pathognomonic symptom, not only of perennial hay fever, but of any form of allergy.

(3) An etiologic factor in perennial hay fever may be a sensitivity to any inhalant protein. A sensitivity to any food and some drugs may be a primary cause, and is a frequent secondary factor, in perennial hay fever.

(4) Multiple sensitivity is the rule.

(5) Paranasal infections are usually only coincident with the hypersensitive state, and are probably never a primary factor.

(6) Heredity is the chief factor in determining whether a patient will ever develop symptoms of perennial hay fever.

(7) Additional evidence that perennial hay fever is based on a hypersensitiveness to some atopen is the fact that perennial hay fever, seasonal hay fever, asthma, eczema, and migraine, are all interchangeable in the linkage.

(8) General health of perennial hay fever patients is far above the average.

(9) Complications are common in perennial hay fever, asthma being the most frequent one.

(10) Nasal surgery in perennial hay fever is often needlessly done.

(11) Mental activity of perennial hay fever patients is above normal.

(12) Dermal tests in perennial hay fever, on the whole, are unsatisfactory.

(13) Treatment consists of three measures, namely, elimination, education and desensitization.

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DISCUSSION (*Abstract*)

Dr. Grafton Tyler Brown, Washington, D. C.— Itching is an extremely important symptom of sensitization, but I would not say that it is a pathognomonic one. Some years ago, Chandler Walker, in a paper on perennial hay fever, called attention to the importance of itching of the eyes in differentiating sensitive from non-sensitive individuals.

I thoroughly agree with the opinion that a positive reaction to house dust extract is almost always due to sensitization to some of the common inhalant substances contained in the dust, such as animal epidermis, pollen, orris root, or pyrethrum. However, I occasionally encounter a patient who reacts to house dust extract, and is negative to all other test substances, proving that there is some unidentified atopen contained in the dust.

Flaxseed or linseed meal is a common ingredient of chicken mash, and I have had several patients with severe perennial hay fever and asthma, whose trouble was due to sensitization to this substance.

In my opinion, vasomotor rhinitis or perennial hay fever is quite commonly due to bacterial infection and sensitization. In other words, a considerable percentage of these patients do not react to foods, animal epidermals, pollens, orris root, or house dust, but give definitely positive reactions to bacteria cultured from their nasal secretions, and treatment with autogenous vaccines of the reacting organisms brings about complete recovery. It is not always possible from the history alone to differentiate the true sensitive perennial hay fever patient from the non-sensitive or bacterial one. Marked deflections of the nasal septum, causing contact with the turbinates, may occasionally produce symptoms closely simulating perennial hay fever. Such cases are cured by submucous resection.

I cannot agree with Doctor Balyeat that the intradermal method of testing is more satisfactory than the dermal. It is true that the intradermal method is more delicate, but it also gives a number of false or non-specific reactions. I interpret all intradermal tests after thirty minutes, and again twenty-four hours later. I consider the dermal method sufficiently sensitive when one uses potent test substances in their most concentrated form. Intradermal testing is somewhat dangerous, as a number of severe constitutional and even fatal reactions have been reported. Doctor Balyeat wisely avoids this danger by first testing each patient dermally.

One factor that Doctor Balyeat failed to mention in his excellent paper is calcium deficiency, which I consider very important. A patient with severe perennial hay fever gave marked positive reactions to a number of different foods, which were completely eliminated from her diet for several weeks, with no effect on the hay fever. Examination of her blood revealed a calcium deficiency, and I prescribed parathyroid, which acted like a specific in clearing up her symptoms, even though she continued eating the foods to which she had given positive reactions.

Dr. Hal M. Davison, Atlanta, Ga.—When I first began the study of this type of case I depended almost entirely upon the presence of eye symptoms for the diagnosis of perennial hay fever. We found some cases which gave typical skin reactions, but had no eye symptoms whatsoever. However, I am still of the opinion, when I find cases with marked itching, that this can be depended upon for diagnosis more than any other one symptom.

Several other types of disease must be associated with this clinical entity. Two years ago a small epidemic of cases of conjunctivitis similar in appearance were treated by an ophthalmologist without results. Some of these cases were finally tested and found to be sensitive to orris root. They had no sneezing but simply a conjunctivitis with itching.

Another case complained of dry pharyngitis with itching. This patient was sensitive to yeast and to chicken feathers, and the symptoms were relieved by avoiding these.

I have also come in contact with two cases of drug allergy producing eye symptoms, one due to ipecac and the other to delphinium. Another case of allergic coryza sensitive to horse epithelium was desensitized and could ride or curry his horse with impunity.

We have found cases of continued sneezing throughout the year, not very troublesome, but sensitive to house dust, feathers, and so forth.

As to the question of foods causing hay fever, the history of the patient is very often entirely misleading.

Whether house dust is a true atopen is somewhat questionable. Doctor Cooke, of New York, perhaps the greatest living authority on that point, says that he believes house dust can be a cause of perennial hay fever. A fair percentage of cases in Atlanta are sensitive to flaxseed and they give an extremely marked reaction. They also react to cotton seed.

Dr. William Allan, Charlotte, N. C.—I wish to disagree with Doctor Balyeat's statement that migraine is interchangeable in heredity with asthma or hay fever, or anything else. I think the idea of heterogeneous heredity is a pernicious one. It has been shown that migraine is inherited as a dominant unit Mendelian character, and that it is not interchangeable with other syndromes in heredity.

Dr. Balyeat (*closing*).—Those who study the allergic subject very extensively have all come to the conclusion that asthma and hay fever are inherited according to the Mendelian law. There has been some question as to whether they are transmitted as a recessive or a dominant factor, but I think that the consensus of opinion today is that the transmission is as a dominant one. I have a series under study at the present time in which I feel confident that they are inherited as a dominant factor. Likewise, is migraine inherited and, although there is some question, it seems that migraine is interchangeable in the linkage with asthma and hay fever. We have many cases on record to substantiate this point.

The majority of our perennial hay fever patients have eye signs that are not prominent. Occasionally one of them will be sensitive to some substance that will produce eye symptoms. Itching of the mucous membrane of the eye or upper respiratory tract has been present in every seasonal hay fever case studied in our Clinic, and is frequently a very disturbing symptom. The difficulty in recognizing perennial hay fever as allergy frequently arises from the fact that the itching sensation is not marked compared with that of the seasonal cases, and therefore it is often overlooked. Many of the perennial cases have not the marked nasal blocking and the copious mucus from the nose that is usually seen in seasonal cases. Many of them complain of a mild head cold all the time, winter and summer, with slight itching of the nose. Others complain of slight congestion of the nose, with marked eye signs, but these are few compared with the former.

Doctor Davison mentioned the throat condition, which was a very unusual one. I had a patient, a woman 44 years of age, who gave a history of aching and itching of the posterior pharynx of four years' duration. On close questioning there was elicited a history of very slight itching of the inner canthus of the eye and slight congestion of the nose, with mild itching of the eustachian tubes. The symptom which was prominent, and the one which bothered her most, was the aching and itching of the posterior pharynx. Skin tests were negative except for orris root and chicken feathers. Eliminating feathers from her home and desensitizing with orris root gave her complete relief from her throat symptoms.

In regard to Doctor Brown's discussion as to bacterial factors, those are the cases that I do not consider true perennial hay fever. On questioning, one will find that they have not the sensation of itching which is found in a case of true perennial hay fever. In regard to the pathognomonic sign I referred to, I hesitated for a long time to use such a term. It is probably not present in every case of perennial hay fever, but in the series of fourteen hundred cases which we studied of perennial hay fever, seasonal hay fever, and some of the other manifestations of allergy, there was not a single case which did not give a definite history of itching.

There was a time when I saw many cases of tuberculosis, and I considered the history of contact very important. That is, if a patient came in with some atypical symptoms and signs which made one think of tuberculosis, but there was no history of childhood contact, I felt that it was up to me to prove definitely that the condition was one of tuberculosis before making such a diagnosis. If there was a definite history of childhood contact, and the patient complained of symptoms which were somewhat vague, one would be much more justified in making a diagnosis of tuberculosis than in a case without a history of contact.

If a child is suffering from a wet nose, if there is a history of some allergic condition, namely, eczema, urticaria, asthma, hay fever or migraine, in the family strain, especially in the relatives of the first degree, one had better be rather careful in attributing the wet nose to some deformity of the nose instead of a specific sensitivity to an atopic substance.

I have been very much interested in the general health of allergic patients because I think if an asthmatic went to a hundred of our best internists in the United States, that 85 per cent would spend 90 per cent of their time in x-raying the colon, gall bladder, teeth, chest, or heart, and spend a very small amount of time in investigating the allergic condition from the standpoint of protein tests. The very fact that many of these patients are perfectly healthy outside of the allergic condition, as I pointed out in my paper, to me is evidence that in the majority of cases one would not often err in spending little time in all investigation except for testing for the specific protein to which the patient is sensitive.

THE PREVENTION OF RABIES BY LEGISLATIVE ENACTMENT*

By CHARLES O'H. LAUGHINGHOUSE,†
Raleigh, N. C.

Rabies exists everywhere from the arctic to the tropics, and is among the oldest of recognized diseases. All mammals, including man, are susceptible. It is contracted by inoculation of infectious saliva introduced by the bite of a rabid animal, usually the dog. It invades the nerve cells of the brain, pancreas, mammary glands, salivary glands and probably other secretory glands.

The purpose of this paper is to bring the prevention of rabies to your attention. We do not know how many cases or how many deaths have been prevented by the administration of prophylactic vaccination, but we do know that in North Carolina we have treated more than fifteen hundren people in a year who were bitten by dogs proven by post-mortems to be rabid. It is conservative to assume that one in ten of these patients would have developed rabies had no treatment been administered. We have had at no time more than five deaths in any one year, so we believe that we have sufficient reason for stating that one hundred and fifty deaths a year have been prevented by prophylactic vaccine treatment.

We are free to admit all that can be said in favor of the prophylactic vaccine treatment, but it is painful, expensive, tedious, and carries with it remote possibilities of most disagreeable sequelae. There is a sentiment against it more pronounced than against other forms of immunization, probably on account of the fact that one has to receive twenty-one injections over a period of three weeks. This lengthened torture is complained of not only by the patient but by his or her physician, and we, as health officers, are well aware of the fact that there is another means of protection which is cheaper, safer, more humane, free from sequelae, and that guarantees complete protection of both man and beast.

The opportunity for complete extermination of any disease rarely presents itself. We can reduce the incidence of infection, as well as the death rate ofttimes, but we have no evidence to give us hope of entirely exterminating typhoid fever, for example, or diphtheria and like infections.

Nowhere is rabies more prevalent than in the states represented by the Southern Medical Association. North Carolina has to admit the first case of rabies recorded in this country in 1762. It is now asking the support of this Association in an effort to save life, as well as to atone for having recorded the beginning of a disease which has infected all its sister states. It hopes to follow the example of Great Britain, Norway, Sweden and Australia, and adopt their methods of extermination.

These countries have made it impossible for infected dogs to bite other animals and persons. This is done by restricting the liberty of dogs and by requiring a six months quarantine for imported dogs. Dogs are muzzled or confined to the premises of their owners and all dogs without homes are destroyed. Just so soon as it is made impossible for infected dogs to bite other animals, rabies is exterminated. When once exterminated, it can be effectually kept out of any country by quarantine of all imported dogs. Australia has always had a six months quarantine for imported dogs, and never has had a case of rabies.

It is said that a law providing for the above measures cannot be enforced. We do not believe this to be true. We admit that enforcement will not be easy in the beginning, but we are not willing to admit that our people are more ignorant and prejudiced than are the people of Great Britain and Scandinavia. When the object of the law is given full publicity, there is every reason for believing that public sentiment will give it the stamp of approval, and public sentiment is law.

North Carolina adopted a stock law a few years ago, designed to prevent the running at large of cattle and hogs. The measure at first was violently opposed and many believed that the common people would take up arms rather than submit to it. The law is now a complete success, and the people would not do without it.

Just a few years ago the State, with the assistance of the Federal Department of Agriculture, determined to eradicate the cattle tick by the dipping of cattle. This law for a short while found opposition, which opposition went so far that a few ignorant people destroyed dipping vats by dynamite, but the opposition soon passed away and today the State is free from the cattle tick.

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*Read in Section on Public Health, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

†State Health Officer.

There is no reason to believe that the eradication of rabies will not be equally successful and equally possible, just so soon as the people become acquainted with the purpose of the law. The Federal Government will, of course, be needed for complete success of the law, but this should be secured without difficulty. Congress has been accused of being somewhat niggardly in its expenditures for human health, but no such accusation has been heard where the health and safety of livestock are concerned. Both Congress and the people can be shown the enormous annual loss of cattle, horses, hogs and sheep from rabies, and it will, no doubt, prove a most convincing argument for the muzzling of dogs, because such a law takes care of both livestock and human beings.

The prophylactic vaccination of animals will not eradicate the disease. It is only palliative and offers no hope of extermination.

Japan tried it and failed. For some ten or twelve years it has attempted universal vaccination of dogs, and, while rabies is not so abundant in Japan as formerly, it is nevertheless quite prevalent.

Ten years of trial with resultant failure in Japan of the prophylactic vaccination measure, when compared with the twenty-two months which it took completely to eradicate rabies from Great Britain, answers in the negative the idea of prophylactic vaccination treatment in lower animals. It is impossible to vaccinate every dog and revaccinate every hog every year for time immemorial.

North Carolina's Board of Health expects to ask the next legislature to pass a law to muzzle dogs or confine them to the premises of their owners and to destroy all dogs who have no owners. Unless our neighboring states cooperate in the passing of similar laws, we cannot hope to eradicate rabies in twenty-two months as Great Britain did, but if we can get the cooperation of our neighboring states, rabies will be exterminated. What may North Carolina expect from her sisters?

DISCUSSION (*Abstract*)

Dr. Clarence A. Shore, Raleigh, N. C.—In my experience the owner of the valuable dog has been in favor of such a law. The stock raiser and the farmer should be very enthusiastic also about eradicating rabies. It is impossible to know just how much livestock dies annually in the State of North Carolina of this disease.

The vaccine as prepared is intended for prophylaxis against the disease and to be given to those dogs that have been bitten. If it is given by veterinarians for treatment after the dog has been bitten, even up to six doses of this vaccine, it is not good.

Dr. W. C. Hatchett, Huntsville, Ala.—In 1926, in Huntsville, an ordinance was passed providing for a man known as Dog Catcher who is elected by Council. He has a Ford car rigged up as a cage to take care of stray dogs.

Dr. James A. Hayne, Columbia, S. C.—I feel very deeply upon the rabies situation. I saw about six weeks ago a case of rabies in a boy 16 years of age. He had been bitten by a dog, but had no idea the dog was mad. His physician thought he was suffering from neurasthenia and gave him sedatives. He died of starvation. There is no disease more horrible, and it is 100 per cent fatal.

We treat from the laboratory in Columbia about 1100 a year who have been bitten by rabid animals; 1100 people who get 21 doses each.

I saw in Panama a case of rabies that was imported by Americans who went there. Rabies was imported into England in the same way. Every military company usually had a mascot and these dogs bit the British dogs. As another speaker said, the man with the bird dog is perfectly willing to take care of his dog, but they do not constitute a majority of the intelligent voters. The intelligent voters are opposed in my State to any interference with their dogs. You haven't solved the question until you have dealt with every animal in the United States. I know no animal that does not have hydrophobia except the pigeon. We have dogs, hogs, cats, goats, mules, cows: the head of every known animal has been sent to the laboratory. Why pick on the dog? The cat has rabies. There are almost as many cat bites, monkey, raccoon and fox bites as dog bites. Of course the dog is the major offender, but you must take care of all the others, and the attempt would be like the Volstead Act, "a noble experiment."

Dr. Clarence A. Shore, Raleigh, N. C.—This is certainly more than an experiment. It has been tried with great success in several countries. The dog is responsible for the disease because he is the only animal that has almost universally the symptom of wishing to bite when he has it. Cases other than dogs with this symptom are in the minority.

Dr. Paul Eaton, Augusta, Ga.—In Texas rabies is not limited to dogs. It is among the wolves. It would be as hopeless to exterminate it as to exterminate the bubonic plague which has gotten into the ground squirrels in California.

Dr. J. Symington, Carthage, N. C.—In Moore County a number of people and some valuable animals, including a cow and a mule, have been bitten by mad dogs since February 1, 1928. The injections are painful and twenty-one are necessary to prevent the development of hydrophobia. This in itself is a strong reason for instituting measures to prevent the existence of hydrophobia.

This is a very serious question which we as public health men must push. If we do not we shall be criticised not only by the medical profession, but by the general public. Personally I should prefer to see tigers roaming wild in the forests of North Carolina rather than mad dogs in the streets of its towns and villages and along its country roads.

Any reasonable measures to stamp out hydrophobia ought to have our support. One speaker has said that

Great Britain and Ireland are islands and therefore it is an easy task for their inhabitants to rid their countries of hydrophobia.

Scandinavia and Denmark are not islands, and for their size have comparatively large land boundaries. Sweden borders on Russia, where wolves, as well as dogs, harbor hydrophobia. Australia, which has also succeeded with the problem, has about the same area of land as the United States, although less than a tenth of the population.

If these comparatively smaller and poorer countries can afford to exterminate hydrophobia, surely the most prosperous and richest country in the world can do so.

Dr. Frederick Taylor, High Point, N. C.—In Texas they not only have wolves, but skunks with hydrophobia.

Australia has no rabies.

I have seen only one case of rabies. The patient's first symptoms were in his arm, and he said nothing about having been bitten. The physician who examined him thought he had neuritis; found sugar in his urine and diagnosed diabetic neuritis. The next day he was in convulsions. In looking the matter up, I found that glycosuria is often noted in rabies.

The eradication of this disease can be accomplished not in a day or a week or a year, but it is worth while making a start. The mere fact that it is difficult is no reason to neglect it.

THE TREATMENT OF INFLUENZA*

By C. Hilton Rice, Jr., M.D.,
Montgomery, Ala.

Except, perhaps, for the summer diarrheas, in my own section I am called on to treat more cases of influenza than of any other disease. And from the observation of these cases I have formed the impression that, while treatment appears to be fairly well standardized for the adult, the treatment of influenza in the child is a rather muddled, free-for-all affair in which there is much harmful and thoughtless therapy. In the absence of a specific therapy, physicians in general have not learned to treat influenza nearly so well as they have learned to manage, for example, infectious diarrhea and typhoid fever. Certainly, in a purely empirical way we have made advances in the treatment of many other diseases of childhood, chiefly, perhaps, by the abolition of needless and meddlesome therapeutics. But the treatment of influenza, I think, is much in need of reconsideration so that we may reach a general agreement as to what methods are harmful and what are helpful.

Because little that is new has been learned about influenza, many physicians still prescribe what, at one time or another, was in vogue and endorsed by good text book authority. Others prescribe favored remedies from force of habit. Still others, feeling the urge toward originality, hit upon some particular method of treatment and make astounding claims for it. I remember a venerable physician, who had enjoyed a large patronage for fifty years, who told me that he never had lost a patient from pneumonia. His remedy was tincture of aconite with another tincture, the name of which I have forgotten. More recently another veteran of the profession passed on to me a treatment so potent that it never had failed him in the treatment of any type of pneumonia in childhood, and was particularly effective in influenza pneumonia. His treatment was the use of a quilted jacket to be worn during the fever stage to prevent the chest from becoming chilled. Another physician informed me that, in his hands, aromatic spirits of ammonia had proved to be a specific for influenza.

Some have expressed their faith in quinin. Others believe that fresh, cold air is the prime essential. Not a few fear antipyretic drugs and prefer the ice cap and cool sponge baths to control temperature. Some like to keep the bowels moving and force nourishment into the child. Not a few have great confidence in digitalis and prescribe it in all cases of influenza pneumonia. Many have confidence in the inhalation of medicated steam, and no end of cough mixtures are in vogue.

I mention these various methods to illustrate the state of affairs in the treatment of influenza. It shows how difficult it is for us to learn by experience; how prone we are to form contrary opinions from observation of the same phenomena. In the management of one of the commonest diseases we still are divided as to the value of quinin, digitalis, cold fresh air and cool sponge baths. As each of these agents is potent enough to help or harm a sick child, it is time that we retest their value.

Is quinin of value in the treatment of influenza? From my own experience with the drug, from its use as a family remedy, and from observation of cases seen in consultation, I am convinced that quinin is not only valueless but actually harmful in many cases. A fair dose given to a child that is restless, coughing and refusing its food is almost certain to produce nausea. And nausea is a symptom I do not like. If the body is a bi-polar electrical mechanism, as Dr. Crile believes, then a sick stomach may be likened to a short circuit that rapidly reduces the battery's charge of energy.

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*Read in Section on Pediatrics, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

Should digitalis be given as a routine treatment in influenza pneumonia? I cannot see the wisdom of giving any drug as potent as digitalis just because a child has pneumonia. Very few of us know how to use the drug to the best effect, and unless there is definite evidence of a failing heart, it is thoughtless meddling to tamper with something as finely adjusted as the cardiac mechanism. Time and again I have seen cases of pneumonia that were receiving full doses of digitalis for no reason other than that the attending physician held the belief that in all such cases the heart must be supported. And always I have felt that these little patients were handicapped by it. Certainly I have never seen one of these cases harmed by stopping the drug. In fact, I often times have seen restless children, who refused food, show prompt improvement when all medication, including digitalis, was discontinued.

In a disease as debilitating and long lasting as influenza the most judicious use of drugs should be employed. There are but two drugs that appear to me to be of positive value: aspirin with some form of opium, preferably camphorated Dover's powders. Given during the acute stage they reduce temperature and relieve pain and cough, thereby bringing comfort to the child. Except in the seriously sick case that needs stimulation, I do not believe that the whole list of other favored remedies has any value whatever.

Does the influenza patient do better in cold fresh air or in warm fresh air? For answer I have nothing to offer save my own opinion unsupported by comparative case reports. I have tried both methods of treatment and am convinced that a child with influenza does very much better in a warm, ventilated room. I never have been able to see the beneficial effect of the cold air treatment that some excellent authorities still advocate. The number of cases of influenza increases with the raw, cold spells of weather and decreases promptly with the advent of a clear and warmer atmosphere. In fact, an influenza epidemic that has lasted all winter and into spring will die out suddenly in the first warm days of April. Since raw, cold air lowers resistance of the normal organism to influenza infection, why should it be of benefit after infection has occurred? The instinct of the sick animal is to seek shelter from the cold in thick brush or cave where the air is still and the rapid loss of body heat is lessened. Certainly we all are agreed that a sick child should be kept warm and it is a difficult matter in the average Southern home to keep a restless child warm with clothes and bed cover. The easier way for both patient and attendants is to warm the air of the room. I can no longer go into the cold room of a coughing child, feel its cold cheek and nose, and be assured that all is well.

The cold air treatment came as a reaction against the old custom of shutting out all fresh air and overheating the sick room; also from the obvious fact that a cyanotic patient needs oxygen. As usual, the reaction was too violent and some of us, with the enthusiasm of new found knowledge, not only raised all the windows, but actually put our pneumonia patients out into the raw elements on the open porch. Now the pendulum is swinging back and our patients are once again in the sick room with all the windows closed except one, for some of us still argue that cold fresh air, about fifty degrees, anyhow, is quieting and stimulating to the child sick with pneumonia. I will admit that this is better than the open porch, and that fresh air is the prime essential in the treatment of respiratory infections, but I can no longer see the virtue of cold air. That is to say, I have not been able to observe the clinical evidence that cold fresh air is more stimulating, or soothing, or healing to acutely inflamed bronchi and air cells than warm fresh air. Not only am I convinced that influenzal pneumonia is better treated in a warm, ventilated room, but feel equally sure that rest in bed in the warm room is the best preventive we have against pneumonia as a complication of influenza in children.

Are cool baths of value in controlling the temperature in influenza? If, as a part of his training, every physician could have influenza and be given one cool bath, the question would never again come up for discussion. To one with the aching, chilling sensations that accompany influenza, the experience is agonizing. The whole sensory system cries out in protest at each touch of the cool sponge. The temperature may be reduced, but the nervous shock is usually terrific.

Influenza and any kind of bath are incompatible. Few well children enjoy a cool bath, and to subject a panting, shivering, well-nigh exhausted child to the wrecking discomfort of the cold sponge or wet sheet merely to reduce temperature is, to put it mildly, a questionable procedure. And then to order the bath or cold pack to be repeated every three or four hours is something that passes my understanding.

What, then, is the treatment of influenza? Suppose we go now in consultation on a case in an average Southern home.

While we are taking off our overcoat and warming our hands in the front room the attending physician informs us that the patient, a child of eighteen months, is seriously ill from a "flu" pneumonia. Temperature has been high and hard to control; pulse one hundred and forty and respiration around fifty. Because the child has been very restless, nauseated and has taken very little water and no food, a special nurse has been put on the case.

With this information we enter the sick room and immediately various impressions begin to register on our consciousness. There is a small fire in the open grate, but the room is cold. We feel and see an open window. The mother is sitting close by the fire with a shawl about her shoulders. She has a coryza. The nurse has on a heavy sweater. Her hands have the appearance of cold hands. There is a bowl of cracked ice on the window ledge for refilling the ice cap. We shiver uncomfortably and move toward the fire. The nurse removes the bowl of ice and pulls down the window in preparation for our examination. We glance at the sick bed in the far corner and observe a small mound of heavy cover topped with an ice cap. From under the ice cap come little puffs of vapor accompanied by expiratory grunts. There is the sound of a cough, a fretful cry, then a succession of little hacking coughs. The cover moves and a small hand appears that pushes with desperate intolerance at the ice cap. We move over to the bedside and feel of the hand. It is cold. The nurse explains that it is difficult to keep the baby covered. We feel for the pulse, but the hand is pulled away. We try again, and then again. For a few seconds the baby submits in weary resignation and we catch the pulse. It is a very good pulse. The respiration is shallow and grunting, but there is no cyanosis. The child is entirely rational, but rolls its head restlessly, protrudes its tongue at intervals and gags slightly. Its general appearance is one of utter wretchedness. There is a moment of straining whimpering as the bowels act. It is the fourth action from a morning dose of oil. The oil is the fourth dose in six days of illness. A round of calomel also has been given. The baby is very toxic and the physician is eliminating the toxins.

While the cold hands of the nurse change diapers we take advantage of the exposure to make a quick examination of the chest. There are rales everywhere and scattered areas of bronchial breathing. The child has bronchopneumonia, probably from influenza. The nurse exhibits the soiled diaper. It contains nothing but greenish mucus from an irritated, empty bowel. The mother thinks it is some of the "cold" that the oil is eliminating. The ears and throat are negative.

Our examination complete, we move again to the fire as the nurse opens the window to re-admit the life-saving oxygen. In our best ethical manner we assure the mother that Dr. X is entirely correct in his diagnosis. We now make courteous inquiry of Dr. X as to medicine and food. We learn that the child is taking quinin every four hours, digitalis every six hours, an ammonia cough mixture every two hours to keep the secretions loose, and a fever powder of aspirin every three or four hours as needed. Since the nurse came on the ice cap and cool sponge baths have been used to control temperature. A one to three mustard plaster is applied every four hours.

As to nourishment, the child has proved to be a difficult one to feed. In fact, he has gotten so he cries and fights at the mere sight of glass and spoon. Since yesterday he has vomited all forced feedings of broth and rice water and the physician has substituted a teaspoonful of nutritive elixir every three hours.

We tip-toe back to the bedside. The child is fitfully dozing now from relief from the griping action of the oil. And the child looks slightly better. We feel that it is a case that ought to recover.

We now are in the comfortable front room to discuss matters with Dr. X. He is a reputable, conscientious man of long experience. He knows there is nothing new in the treatment of influenza and he can quote a text book authority for everything he is doing in this case. And yet we have the strong impression that Dr. X is seriously handicapping a child that is fighting hard to get well. With deadly routine he is merely treating a case of influenza. He knows nothing of the art of treating a particular patient under particular conditions. He does not know that the quinin here is doing no good whatsoever; that it is most likely responsible for the nausea and should be stopped. He has not seen that there are no indications for digitalis. He has not observed that his ammonia cough mixture has failed to affect the bronchial secretions or the cough and is merely one more irritant to a failing stomach.

In short, he is heroically fighting a disease called influenza without ever sensing that his weapons are missing the disease entirely and landing with damaging impact against an immature nervous system. He has not caught the desperate signals of a tortured brain center that now is amplifying tenfold the successive shocks from mustard and cold sponge, from ice cap and forced feedings, from cold hands and spoonfuls of nasty medicines that gripe and nauseate.

What better treatment shall we suggest to Dr. X? Obviously, in this case, the treatment is to discontinue all treatment. If we do no more than that we can be sure that tomorrow the baby will be better.

While this case is pictured from actual experience, it is drawn, of course, to illustrate what harm may be done from thoughtless treatment. The great majority of influenza cases are home cases. The great majority of physicians practise their art entirely alone without the advantage of critical supervision of their work. Nothing new has been learned about influenza. The result is that influenza is now too often treated as it was twenty years ago.

In the home treatment of influenza the only agents that have positive value as routine meas-

ures are these: a well ventilated sick room kept at a temperature of 70°, and aspirin or phenacetin with some form of opium. The value of other remedies as mustard plaster, steam inhalations, warm or tepid baths and stimulants depends on their indication in a particular case and the reaction of the patient.

DISCUSSION (*Abstract*)

Dr. J. Mac. Bell, Mobile, Ala.—I think if I were going to write a paper on the treatment of influenza, my title would be more or less the drugless treatment of influenza. In discussing the paper I wish merely to emphasize some of the points Dr. Rice brought out.

First, warm, fresh air, particularly. I recall some few years ago a short pediatric service in one of our Northern institutions in which we internes were more or less called upon to roll our little fellows out into the corridors, where the cold air was invariably under thirty. Having suffered from influenza at one time myself, I personally do not feel that it is very welcome to a little fellow with influenza pneumonia.

Second, warm hydrotherapy, in contrast to cold. I have never found the ice cap very helpful in my cases.

Third, alkalinization, which I do not believe the essayist mentioned. I find the alkalinization can be maintained very readily and very pleasantly with the use of fruit juices and ginger ale.

I do not believe the essayist mentioned feeding. Especially in the younger cases, sweet milk should be dispensed with entirely. Buttermilk may be used with discretion. I find thick cereals, fruit juice and buttermilk are taken quite readily.

The potential complications are so many and so varied that it behooves us to keep these little fellows in bed for a thorough convalescence.

PROTEIN INTAKE*†

By J. L. BRAKEFIELD, Ph.D.,
Birmingham, Ala.

A review of the literature on the protein intake indicates the fact that workers are not wholly agreed as to: (1) the average daily intake, (2) whether the average intake is affected by temperature, and (3) whether the average intake of the people in the South is the same as that of those in the North.

The average daily requirement of protein derived from a mixed diet was estimated by Voit[1] to be 118 grams for man and 90 grams for woman. A committee of the Royal Society[2] reported that a proper diet should contain an average daily amount of 100 grams of protein. Dietary studies compiled by Longworthy[3] show the protein intake to vary from a minimum of 88 grams to 177 grams, the average amount being about 100 grams. Chittenden[4] carried out experiments which show that the protein intake for a man of 70 kilo body weight should be 60 grams. Pearl shows 121 grams as the average daily protein intake of the people of the United States.

The literature thus indicates a wide range of results from a minimum of about 70 grams to a maximum of 177 grams as the daily intake, the average being about 100 grams.

It was thought by some that the wide range of results as to the average intake might be due to variations in the temperatures in different parts of the country. Denis and Borgstrom[5] and Borgstrom and Bost[6] found that the average daily intake of medical students at New Orleans was 69.5 to 76.1 grams. These workers concluded that the protein intake in the South is less than in the North and that this is because of the warmer climate. Beard[7] found the average daily intake of medical students, in winter, at Western Reserve, to be 76.7 grams. He concludes that temperature has little or no effect upon the intake, and that the intake of protein of students in the North is practically the same as that of those in the South.

EXPERIMENTAL

It was the purpose of the experiments reported here to determine: (1) the average daily protein intake of people of approximately 70 kilo body weight; (2) whether the protein in-

TABLE 1

TOTAL AVERAGE NITROGEN OUTPUT IN WINTER MONTHS DECEMBER TO FEBRUARY

Number of Subjects	Home	Average Weight	Av. Urinary Nitrogen per 24 hrs. (grams)
16	Dormitory	Approx. 70 kilo.	11.13
20	Fraternity	" " "	11.10
12	Private home	" " "	10.80
	Total average for group		11.01

TABLE 2

TOTAL AVERAGE NITROGEN OUTPUT IN SUMMER MONTHS JULY AND AUGUST

Number of Subjects	Home	Average Weight	Av. Urinary Nitrogen per 24 hrs. (grams)
12	Dormitory	Approx. 70 kilo.	10.90
10	Fraternity	" " "	10.70
10	Private home	" " "	11.02
	Total average for group		10.87

*From the Department of Biology, Howard College Birmingham, Ala.

†Received for publication February 18, 1929

take is definitely affected by temperature, and (3) whether the average protein intake of people in the South is practically the same as that of those in the North.

Because of the fact that weight of the individual seems to have a bearing on the intake, men students of approximately 70 kilo body weight were selected for the experiments. In order to be certain of a reliable average, groups were selected from men staying in the dormitory, in private homes and in fraternity houses. Twenty-four hour urine outputs were analyzed for nitrogen by the Kjeldahl method. To the results thus obtained was added 10 per cent for the nitrogen which was lost in the feces.

Determinations were made over a period of three winter months, December to February, and two summer months, July and August. The results for the determination made in the winter months are recorded in *Table 1* and those for the summer months in *Table 2*.

The total average nitrogen eliminated by the group recorded in *Table 1* was 11.01 grams and that of the group in *Table 2* was 10.87 grams. These amounts correspond to 75.7 and 74.7 grams of protein respectively after 10 per cent has been added for that lost in the feces.

The results of these experiments show:

(1) That the average daily intake of protein of students of approximately 70 kilo body was 74.7 grams in summer and 75.7 grams in winter.

(2) That the average protein intake of students of approximately 70 kilo body weight was practically the same in summer as in winter and that temperature has little or no effect upon the intake.

(3) That the protein intake for students of the South was practically the same as that which Beard found for students of the North.

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POOR APPETITE IN CHILDREN*

By CHARLES GILMORE KERLEY, M.D.,
New York, N. Y.

In this study only children of eighteen months of age and older are recorded; further, only those are included who failed to show definite signs of disease either in or without the digestive tract. The complaint for which this group of patients came to us was loss of appetite.

In a considerable proportion there was the associated symptom of abdominal pain, usually occurring before the meal and in the pain cases there was usually nausea and vomiting. Eructation of gas, constipation, irritability and failure to grow also figure in the histories.

In our observation of previous groups of cases of similar nature, we have found that in practically all showing the above symptom complex there is a high total stomach acidity.† We have also found that feeding errors covering long periods of time, perhaps the entire life of the child, have preceded the visit. The most frequent error is over-feeding. It is not uncommon for us to see children complaining of loss of appetite who are being fed five or more times a day, and on food usually quite unsuitable. In explanation of the frequent feeding the story almost invariably is that the child takes so little food that it is necessary to give it often, and there is the familiar story of coaxing, urging and forcing.

When these poor appetite cases apply for treatment, they are given a complete physical examination. If everything is found normal, instructions are given as to the general care and hygiene, which includes rest periods, hours for sleep, clothing, bathing and absence of overstimulation of the nervous system. The patient is given a plan calling for three meals a day at the following hours: 8 a. m., 1 p. m., and 5:30 p. m. The only restrictions from an ordinary three-meal diet are that orange juice is omitted as a pre-breakfast drink. Iced drinks and frozen foods of all sorts are omitted; likewise spiced foods and condiments, and foods and drinks served highly heated are forbidden. Total stomach hyperacidity is assumed to be present and a powder composed of magnesia carbonate one grain, soda bicarbonate two grains and bismuth subcarbonate two grains, is given ten minutes

*Received for publication January 19, 1929.

†Kerley and Lorenz: J.A.M.A., 79:1814-15, Nov. 26, 1922.

before meals. If there is constipation coarse cereals such as oatmeal and whole wheat products are advised and from ten to thirty drops of the aromatic fluid extract of cascara are given after meals, or in sufficient dosage to produce one or two free evacuations a day. Mothers are instructed not to urge, coax or force the feeding. The child is offered the meals at the hours indicated and if he refuses, nothing is given until the next meal. If the child is old enough to understand I explain to him that he need not eat if he does not wish to and that no one cares whether he eats or not. This attitude takes a lot of fun out of the refractory child's life who delights in his pre-eminence three times a day. In an obstinate case it takes about two days to bring a child to the dining table without a fight. After one or two weeks the results are favorable in about 90 per cent of the cases.

From May, 1927, to July, 1928, we had 115 failures, 60 boys and 55 girls. By failures I mean cases that failed to respond, in whom the appetite failed to improve and who continued to be more or less indifferent to their food. Upon further observation we found other factors in these children than bad feeding habits and unsuitable food. In our use of test meals, stomach lavage and gastro-intestinal observations, we have in the past often been impressed by the amount of food remaining in the stomach four, five or more hours after the completion of the previous feeding. It seemed that delayed stomach emptying might explain the persistently poor appetite in some of the obstinate cases. Hunger pains do not occur in a partially-filled stomach. From the above date we began to study the effect of the emptying time of the stomach on poor appetite and selected for this study those who resisted our plan of management above outlined. In the refractory cases the child is given the usual morning meal, as much as he will take of a cereal, milk and dried bread, and four and one-half hours after its completion the stomach is emptied if there is residue by means of the stomach tube. Drinking water or other fluids are not permitted during this period.

Among the cases studied, aged from eighteen months to twelve years, twenty-six failed to show retention. Eighty-nine showed food retention of from one to four ounces. In nearly all a large amount of mucus was removed with the residue through the tube and by vomiting. Our plan in all cases was to follow withdrawal of the tube with a stomach lavage.

Atropin was given to the point of physiologic effect and the diet continued as before. In twenty-two of the ninety-nine two washings were sufficient for relief of symptoms. Sixty-seven required further attention because of the continued failure of appetite. Of these 42 required three lavages at three or four-day intervals. In 18, lavage was carried out five times; in 3, eight times. In the remaining four, lavages were necessary, in one 10 times, in one 13, in one 15, and one, our most persistent case, was lavaged 52 times. In this case the mother carried out the lavage, the indication being the return of the anorexia. In this three-year-old boy the lavage intervals were gradually lessened and after one year he is well, has a good appetite and has gained eight pounds in the year under observation. Our experience has been that the amount of food residue and mucus removed gradually lessens under atropin, lavage and correct feeding. The appetite returns coincident with the failure to find residue and the characteristic stringy tenacious mucus. Without exception, the cases requiring continued lavage showed large amounts of mucus mixed with the residue. Our theory is that food retention is due in part to pylorospasm, due in turn to gastric irritation and a plugging of the pyloric end of the stomach by the retained mucus secretion. Our indication for repeated lavage is continued failure of appetite and the presence of food residue in the stomach when it should be empty, together with the presence of thick mucus which floats *en masse* in the water withdrawn or vomited.

In conclusion, a vast majority of the cases of poor appetite in children are due to food forcing, too frequent feeding and the unwise selection of food. In a small percentage a proper regime fails. In these, pylorospasm, mucus accumulation and food retention are responsible for the anorexia and associated symptoms of pain, eructation of gas and vomiting.

The relief of the constipation usually present by producing two evacuations daily bears an important relation to the emptying time of the stomach. The use of atropin to the point of physiologic effect is doubtless of much value in preventing pylorospasm and consequent food retention.

This study deals only with disorders of function. The influences of chronic appendicitis, structural gastro-intestinal defects and mal-positions upon stomach emptying and loss of appetite are not a part of our discussion and have been taken up in previous contributions.

Southern Medical Journal
JOURNAL OF THE
SOUTHERN MEDICAL ASSOCIATION

Published monthly by the Southern Medical Association, Empire Building, Birmingham, Ala. Annual subscription $4.00. Single copies 35c each.

Entered as second-class matter at the Post Office at Birmingham, Ala., under Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in Section 1106, Act of October 3, 1917, authorized December 20, 1921.

DR. M. Y. DABNEY, Editor
C. P. LORANZ, Secretary-Manager

Vol. XXII MAY 1929 No. 5

EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
Twenty-Third Annual Meeting
Miami, Florida, November 20-22, 1929
Pre-Meeting Clinics, November 19, 1929

HEALTH ADVERTISING

In America, advertising is the greatest industry. Selling health, or selling anything else by relating it to health, has become a favorite Twentieth Century practice. In the technical departments of any public library of reasonable size are to be found many medical text books and countless books which purport to be medical, which have a wide lay circulation. There is nothing, according to an experienced reference librarian, which the public devours so eagerly as essays upon its health.

To this popular fancy is due, of course, the large fortunes which have been made in patent medicines. It is a very recent thing that the cigarette interests have determined to advertise their products as health giving, and the caption, "Reach for a Lucky instead of a sweet" (to retain one's girlish figure) has apparently caused the sugar interests and other food dealers much concern, and even aroused threats of their ire. They have objected less to the more sharing attitude of another cigarette whose ads read: "Take a box of chocolates and an Old Gold." To the impartial bystander it is doubtful that continually keeping anything in the mouth, sweet or tobacco, is beneficial.

Some of these tobacco manufacturers are advertising extensively over the radio chains, and much pressure is being brought to bear to have this stopped. "The United Restaurant Owners' Association calls to the attention of the Federal Radio Commission an insidious, unmoral and outrageous campaign now being broadcast through the air to 40,000,000 men, women and children in the United States, intended to transform the youth of the Country into confirmed cigarette addicts, regardless of established medical and health findings."

Advertising which helps one industry rarely fails to hurt another, though Hershey's chocolate advertised itself years ago as "A sweet to eat, more sustaining than meat," apparently without greatly injuring meat sales. The raisin growers have long played up the iron content of their product and falsely claimed it a good substitute for meat.

It is a question whether advertising methods are creeping into the medical profession itself. Among professional men, physicians, lawyers, architects, it has long been the custom to forbid all paid advertising, and this is a wise provision. Incidentally, if one man advertises all must advertise, and the cost of a professional education is too great without the added expense of advertisement after it is obtained. If it were customary for members of the medical profession, for instance, to use paid advertisements, no physician would win a practice again on his own merits. Like Old Gold and Listerine, all would be puppets in the hands of expert ad writers, and the much-talked-of cost of medical care would probably have to rise in proportion.

Public health interests have long found it very useful to advertise. Wise publicity to the lay voters has been profitable and necessary to them, though they have not employed paid ads to bring out the desired facts. Wisely used, their methods have greatly enlightened the public on many public health subjects which require money appropriations for their execution.

A distinguished member of the medical profession in Chicago, Dr. Louis Schmidt, has recently been expelled from membership in his

medical society for his connection with a clinic which advertised. His expulsion was followed by the resignation from the society of two physicians of excellent standing in public health circles, Dr. Herman Bundesen and Dr. Rachel Yarros. Whether this represents the beginning of a recognized cleavage between the practising physician and the public health worker is the question in order for solution. It is a very vital problem how far paid advertising, which can rarely be scientifically accurate, is to be allowed to affect medical practice.

CARBOHYDRATE TOLERANCE IN DIABETICS

Insulin is not usually claimed to restore pancreatic function. Although the diabetic patient using it may from all accounts live a long and healthy life, he continues to require approximately the same amount of insulin to keep his urine sugar free, and heed to his diet must continually be paid. A case has been reported[1] of a young diabetic child whose islets of Langerhans showed some evidence of regeneration after a period of insulin treatment; but in general the pancreatic function is not expected to vary greatly under the influence of the drug.

Similarly the cretin improves when given thyroid extract, but his need for this medicament does not cease. The pernicious anemia patient recovers from acute symptoms of pernicious anemia under liver treatment, but must continue to take his liver over an indefinite period, or suffer remissions of the disease.

It is customary to reduce the carbohydrate intake and insulin dosage of the diabetic to the lowest point which will comfortably maintain him. In certain cases, temporarily, high carbohydrate diet and high insulin dosage to take care of it have been given, with, Gibson[2] of Iowa reports, improvement in the carbohydrate tolerance. Gibson describes a patient with failing heart, edema, and nephritis, who had a hypoglycemic reaction on the third day of a high sugar diet, due apparently to increased carbohydrate tolerance.

He then tried on a number of patients the experiment of giving for brief periods high sugar, high insulin diets, and observed in nearly all of nineteen an increased sugar tolerance. He quotes evidence from others that a low carbohydrate diet results in lowered sugar tolerance. In successive periods at intervals of four to five days, he increased the carbohydrate and insulin of patients under hospital management, and obtained a progressive increase in sugar tolerance till in some cases insulin could be omitted and the diabetes controlled by diet alone. This was especially noted in young individuals.

It is to be hoped that these results can be confirmed elsewhere. They may have an important bearing upon the cure of a disease which until recent years physicians have been happy merely to arrest.

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EMBOLISM FOLLOWING AIR INJECTIONS

Injection of air under pressure into the body for diagnostic purposes is fairly common. The ventricles of the brain are inflated to make roentgenograms in certain conditions. The uterus is injected in the Rubin test to determine the patency of the fallopian tubes. The bladder may be injected with air in prostatic or bladder operations. The latter procedure, according to a paper in this issue of the JOURNAL,[3] is harmless if the air pressure is kept under careful control. Other urologists have reported that filling the bladder with air is inadvisable on account of the occasional occurrence of fatal air embolism.[4]

Such a fatal case is reported in detail by

3. Thompson, Raymond; and Todd, L. C.: Observations on Air Urography. JOURNAL, this issue, p. 422.

4. Walther, H. W. E.: Discussion 3. JOURNAL, this issue, p. 427.

Mathe of San Francisco.[5] During the removal of the prostate by the suprapubic route to resect a papillomatous mass at the base of the bladder, the usual incision was made and the bladder was inflated with 300 c. c. of air with a syringe. There was a hissing sound as the silk guy sutures were inserted in the bladder. The patient became cyanotic, the eyes were fixed, pulse, respiration and heart movement ceased, and death ensued. Necropsy showed small bubbles of air in the iliac and mesenteric vessels, vena cava, renal vein; and the lungs, liver, and right heart had a coarse froth of air.

After sending out a large number of questionnaires on the subject, Mathe concluded that air for diagnosis should be abandoned as too dangerous. In case embolism is suspected from the patient's condition after air has been used, Mathe's advice may be helpful. Since respiration ceases first, he says, if the circulation can be re-established by artificial respiration the patient will recover; for huge amounts of air may be disposed of by rapid absorption or elimination. The heart continues to beat after respiration has ceased. Cardiac stimulants should be given and adrenalin put into the right heart.

He perhaps takes too gloomy a view of the subject in advocating the abandonment of all air injections. Bladder injections should be no more dangerous than the same injections which are used without expected fatality in other parts of the body. Mathe says that marked differences in resistance to air embolism exist in different individuals and in different species.

Putting air under pressure into obviously damaged or inflamed tissue is to be avoided. According to Thompson and Todd,[5] air urography is very useful and harmless for delineation of ureteral and kidney stones, and for observations on the lumen of the ureter.

5. Mathe, C. P.: Fatal Embolus Due to Inflation of the Bladder with Air. Surg., Gyn. & Obst., 48:429, March, 1929.

Miami---Where We Meet

MIAMI IN NOVEMBER*

No matter what degree of perfection you have attained in your golf game, it is one of the cardinal sins to visit Miami without your clubs. For dub and pro alike are brothers under the skin in this golfer's paradise, home of all-year golf on eleven sporty courses.

Convention month, for the Southern Medical Association, is the season of Miami's opening golf attractions and although specific dates will be announced later, the Miami Amateur and Miami Biltmore Invitation Amateur should be scheduled about that time.

Both in the city proper and in its contiguous suburbs there are ample facilities for the game that has made Miami famous. The municipal course, one of the finest in the South, is but a short drive from the city, while across Bay Biscayne is another municipal course at Miami Beach. The Miami Country Club course, over which are played annually the International Four-Ball Match and the Miami Open, is available to members of other country clubs.

Just west of Miami, in Coral Gables proper, the Miami Biltmore Hotel has two eighteen-hole courses, while the city of Coral Gables has a short nine-hole course in the city proper.

But golf alone does not cover the field of sport in Miami. November is opening month for the dog races, called the world's cleanest and fastest sport. And across the bay about this time the winter polo outfits are just swinging into action. Among the crack outfits which appear here annually are teams from Chicago, Indianapolis, Philadelphia and other cities, as well as the unique team made up of the four sons of Harvey Firestone, rubber magnate. This includes Russell, Raymond, Leonard and Harvey, Jr., players on the Chagrin Valley team.

The universal sport in Miami, however, is surf bathing, a far cry from the out-of-door

*By Chas. C. Canny, Publicity Department, City of Miami.

—Photo Hamilton Wright.

AMERICA'S GREATEST GOLFERS IN INTERNATIONAL FOUR-BALL MATCH, MIAMI

The cream of America's greatest golf players took part in the annual International Four-Ball Tournament on the Miami Country Club course, drawing the largest gallery of golf fans that has ever followed a tournament in the South. Here are the players taken just before play started on the second day of the tournament, after many of them had been eliminated: left to right—Willie MacFarlane, former United States Open Champion; Walter Hagen, British Open Champion and holder of more than two dozen championships of note; Leo Diegel, Professional Golf Champion of America; Harry Hampton, doughty Scotchman; Gene Sarazen, three times winner of Miami and Miami Beach open tournaments; Charley Mayo and George Christ, Florida team; Johnny Ferrell, U. S. Open Champion; Ed Dudley, California's golfing ace; Clarence Hackney, a star of golfdom; Craig Wood, Pasadena Open Champion; Johnny Golden, former Southern Open Champion; Billy Burke, North and South Open Champion; Henry Cuici, Florida Open Champion; Joe Turnesa, runner-up with Bobby Jones in 1926 Open Championship; and Al Espinosa, leading golfer of the Chicago district. Hagen and Diegel defeated Farrell and Sarazen in the finals by one-up. It was one of the greatest matches of the year. The winning team came from behind on the fourteenth green when Farrell and Sarazen were three-up to score a 20-foot putt (by Hagen), and again on the seventeenth green scored a 3.

exercises of Northern cities at a time when galoshes and overcoats are regarded as dire necessities. In November the Atlantic at Miami shows a temperature of about 70 degrees, which makes it ideal for a cool dip before or after a sun bath on the clean sand.

Add to this the big thrill of college football and you have an accurate picture of Miami when the winter gayety is making it the Mecca for America's playing thousands. The University of Miami, unlike Northern schools, is just launching its football season in November and without the biting cold that characterizes some of the Northern games, you can watch the South's crack elevens line up at the University stadium.

To enumerate all the sports which are featured by Miami is to run the full gauntlet of popular games. The only thriller missing will be the running horses, which do not start until after January.

Book Reviews

Green's Manual of Pathology and Morbid Anatomy. By A. Piney, M.D., M.R.C.P., Research Pathologist, Cancer Hospital, London; Late Director of the Institute of Pathology, Charing Cross Hospital, London; Sometime Lecturer in Pathological Histology in the University of Birmingham. 650 pages, with 261 engravings and 8 colored plates. Philadelphia: Lea & Febiger, 1928. Cloth, $7.50, net.

The volume is not an exhaustive treatise in morbid anatomy, nor does it cover the whole field so thoroughly as some of our American text books. It presents, however, to the reader the fundamental principles necessary for the understanding of disease. In this respect the authors have spared no effort to present an intelligent picture of the processes responsible for altered anatomy, as well as function.

The first part of the book dealing with the subject of general pathology is thorough and the topics discussed are well selected and arranged.

The second part, treating of diseases of special tissues, is brief and touches only the high spots, omitting frequently necessary details. For example, one looks in vain for some mention of tularemia or blastomycosis. Yet a great deal of space is devoted to the consideration of bacteria. The work is well illustrated and attractively printed.

Erythema Nodosum. By J. Odery Symes, M.D., Consulting Physician to the Bristol General Hospital. 72 pages, illustrated. New York: William Wood & Co., 1928. Cloth, $2.00.

The clinical presentation as well as the etiology and pathology are well given. The author concludes that there is a definite relation between this condition and tuberculosis, but this section of the book lacks clarity. The sections devoted to diagnosis and prognosis are adequate. That on treatment consists of a mass of polypharmacy.

A Shorter Anatomy. By E. Wolff, M.B., B.S. (Lond.), F.R.C.S. (Eng.), Demonstrator of Anatomy, University College; Lecturer in Surgical Anatomy, University College Hospital Medical School; Ophthalmic Surgeon, Royal Northern Hospital, etc. 451 pages, with 130 illustrations. New York: William Wood & Co., 1929. Cloth, $6.00.

This manual is especially adapted to the needs of the medical student for reviews of anatomy before examinations. It is brief and adequate. It gives the student at a glance the necessary information concerning origin, insertion, action, and nerve supply of muscles, or the course of arteries and nerves with their branches and their anatomical relationship to other structures.

There are numerous accurate illustrations and many practical suggestions on applied anatomy throughout the book. There is no discussion, however, of the central nervous system.

There is a valuable chapter on ossification and epiphyses, accompanied by x-ray plates and clear cut drawings of the bones.

Diseases of the Nervous System. A Text Book of Neurology and Psychiatry. By Smith Ely Jelliffe, M.D., Ph.D., formerly Professor of Psychiatry, Fordham University, New York, and formerly Adjunct Professor of Diseases of the Mind and Nervous System, New York Post-Graduate Medical School and Hospital, and William A. White, M.D., Superintendent of St. Elizabeth's Hospital, Washington, D. C.; Professor of Nervous and Mental Diseases, Georgetown University; Professor of Nervous and Mental Diseases, George Washington University, and Lecturer on Psychiatry, U. S. Army and U. S. Navy Medical Schools. 1174 pages, illustrated with 476 engravings and 13 plates. Fifth Edition. Philadelphia. Lea & Febiger, 1929. Cloth, $9.50.

This treatise has been fully revised in this edition to incorporate the newest knowledge and advances in the subject of neurology and psychiatry. It is thorough, complete and quite outstanding in its simplicity. The material selected by the authors from the flood of modern research portrays judiciously the newer channels of thought and progress in this field. The book is abundantly illustrated, and contains valuable charts of various nerve tracts. No effort has been spared by either the author or publisher to make an outstanding text book of neurology and psychiatry.

Qualitative and Volumetric Analysis. For Medical Students. By H. Larbourne, M.A., M.Sc., F.I.C., Head of Chemistry Department, The Polyclinic, Regent Street, W. I.; and J. A. Mitchell, M.Sc., Lecturer in Chemistry Department, The Polyclinic. London and New York: Oxford University Press, 1928.

No apology is offered by the authors for adding to the number of qualitative and volumetric books already on the market. Their object, to prepare a small volume to minister to the special needs of medical students, has been attained in this manual, which is wholly unique in its contents and brevity. It simplifies to a great extent the learning of an intricate subject.

In the volumetric section a departure has been made from the conventional classification of titrations and the matter has been so arranged as to enable the student to grasp the idea of normality more easily. The first part of the book contains a comprehensive table of qualitative analysis for examination of one metal and another table for a systematic examination of one acid. This arrangement facilitates the understanding of the subject and eliminates many details which may encumber learning. Part II gives a brief resume of volumetric analysis with particular attention to the simple titrations; back titrations; titrations containing potassium iodids; estimation of arsenic and antimony compounds and other miscellaneous titrations. There are tables on summary of titrations, equivalent weights, atomic weights, aqueous tension and logarithms. The book is heartily recommended to medical students for the condensed and novel way in which the matter is covered.

Roentgenology, The Borderlands of the Normal and Early Pathological in the Skiagram. By Alban Kohler, Prof. Dr. Med., Wiesbaden, ex-President of the German Roentgen Society. 556 pages, illustrated. New York: William Wood & Co., 1928. Cloth, $14.00.

The fact that this book has gone through five German editions speaks for its usefulness. The author's previous contributions to radiology would attract attention to this publication.

The purpose of the volume is best explained in Professor Kohler's preface to the 1910 edition. He is "an adviser on those findings which exhibit or appear to exhibit slight and not particularly noticeable divergences from the normal anatomical picture."

The most outstanding characteristic of the book is the way in which the various changes are described in minute detail. It shows extended investigation and study of each problem presented. A full bibliography is added wherever there is a difference of opinion. If drawings had not been substituted for skiagrams it would have added greatly to the use of the book in studying the normal. Each subject has been presented systematically: first, the normal and its variations; then the early pathological changes; and finally some of the more fully developed processes. The technic differs in many ways from that in America.

As a reference book it is to be highly recommended because of the details with which the normal and the rarer pathological conditions are described. Because of its clarity it can be used by the student as well as the trained roentgenologist.

Modern Problems in Neurology. By S. A. Kinnier Wilson, M.D., B. Sci. (Edin)., F.R.C.P., Physician for Out-Patients, National Hospital, Queen Square; Neurologist, King's College Hospital. 364 pages, illustrated. New York: William Wood & Co., 1929. Cloth, $6.00.

The author has revised a number of his recent papers on some of the more baffling problems of neurological dysfunction and presents them in book form. The epilepsies, narcolepsies, disorders of motility and muscle tone, pathological laughing and crying, dysesthesiae and Argyll-Robertson pupil are discussed at length. The majority of these are clinical "bug bears" and physiopathological enigmas, and are difficult subjects to discuss.

The purpose of the book seems to be to present these problems with the author's neurological philosophy as a background. It is purely academic and highly technical, and will probably be of interest only to clinical and physiological neurologists. The bibliography is exhaustive.

Pediatrics. By Harry Monroe McClanahan, A.M., M.D., Professor of Pediatrics Emeritus, University of Nebraska. 606 pages with 230 illustrations. Philadelphia and London: J. B. Lippincott Company, 1929. Cloth, $6.00.

This work is highly practical and specific in its advice in points of bedside diagnosis and of treatment. There are no detailed discussions of pathology or of history of disease.

The author's own experience in practice renders the work, as a whole, illuminating. Yet, emphasizing personal experience alone in a work of this kind can give only a limited aspect of the subject, and one fails to find, at times, either sufficient breadth of ideas or thoroughness. The latter are sacrificed for the sake of directness and brevity.

There is, however, an up-to-date bibliographic index. The chapters on the normal human infant and on artificial feedings cover the subjects thoroughly. The diseases of the digestive tract and of the nervous system are well presented. The book is especially adapted to the needs of general practitioners.

Methods of Biological Assay. By J. H. Burn, M.A., M.D. (Camb.), Director of the Pharmacological Laboratory of the Pharmaceutical Society of Great Britain. With an introduction by H. H. Dale, C.B.D., Sec. R.S., M.D., F.R.C.P. 126 pages, illustrated. New York: Oxford University Press, 1928. Cloth, $2.55.

This book is a detailed account of the methods used by the author in assaying certain preparations. In his description of the assay of digitalis, strophanthus and squill he gives in detail the usual methods, but prefers the frog method. Other assays which are given in detail are that of pituitary extract (posterior lobe); insulin, arsenobenzene and allied substances; ergot; adrenalin, ovarian hormone, parathyroid, thyroid extract, anterior lobe, pituitary gland, histamine, atropin and other antipyretics.

In a chapter dealing with "the accuracy of a result" the author demonstrates methods of control by these methods. The work is clear, but technical.

Epidemiology, Old and New. By Sir William Hamer, M.A., M.D., F.R.C.P.; Vice-President of the Epidemiological Section, Royal Society of Medicine; Formerly Medical Officer of Health and School Medical Officer, County of London. 180 pages, illustrated. New York: The Macmillan Company, 1929. Cloth, $3.50.

Sir William has divided the book into four principle sections: (a) Influenza, 1915-1925; (b) Epidemics in London in the time of Sydenham and at the present day, some contrasts and some resemblances; (c) the history of epidemiology during the last hundred years. The germ theory and the old epidemiology; and (d) the history of epidemiology during the last hundred years. The return to the Hippocratic method.

Each of these sections is full and worthy of study. There is a complete list of references added which is of value.

The book is not written for the average physician, but it should be of interest to the student of this phase of public health work and is useful for general reference.

Spasmophilia. By Edward C. Wrightman, M.D., former Clinical Assistant in Pediatrics, Northwestern University School, Chicago. 155 pages, illustrated. Boston: Richard G. Badger, Publisher, 1928.

The first half of the book deals with spasmophilia and its allied condition, rickets. The intimate relationship between these two is demonstrated. The author repeatedly shows the importance of keeping spasmophilia in mind when dealing with any nervous disorder in infancy and childhood, especially where convulsions occur. The subject is ably covered as contrasted with the meagre information found in most text books.

The latter half of the book gives an outline of infant feeding, stressing the points that will prevent rickets and spasmophilia.

The frequent use of short and even incomplete sentences makes the book very readable. It contains much valuable information for the general practitioner and is interesting reading for the pediatrist.

A Text Book of Medicine. By Various Authors. Edited by J. J. Conybeare, M.C., M.D., Oxon., F.R.C.P., Assistant Physician to Guy's Hospital. 976 pages, illustrated. New York: Wm. Wood & Co., 1929. Cloth, $8.00.

The aim of the present volume, according to its authors, is to provide within a small compass at as low a price as possible the essentials of medicine. The book is a compilation of ten contributors. Certain sections are worthy of special mention, the one on diabetes being an example. For a student the book is not suited because too little space is allotted treatment. It does not surpass a large number of other text books of similar character.

Certified Milk. Proceedings of the American Association of Medical Milk Commissions, Inc., Certified Milk Producers' Association of America, Inc., and Metropolitan Certified Milk Producers. 328 pages. Brooklyn, N. Y.: American Association of Medical Milk Commissioners, Inc.

This volume is a detailed report of the two societies mentioned. Papers and their discussions are presented in detail. For those particularly interested in this subject it may prove of value, but it is not of general interest to the profession at large.

Southern Medical News

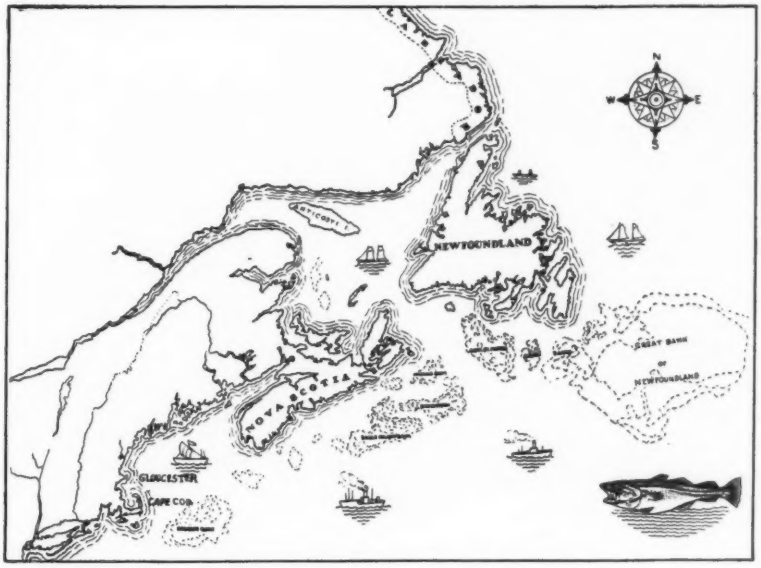
ALABAMA

Dr. Fred W. Wilkerson, Montgomery, has been appointed to the State Board of Censors, to fill the vacancy made by the resignation of Dr. J. N. Baker.

Dr. Lydia J. Roberts, Professor of Home Economics of the University of Chicago, while in Birmingham as the guest of the Birmingham Dairy Council, addressed the Jefferson County Medical Society on "Educational Aspects of Nutrition Work With Children."

Construction of a Medical Arts Building in Birmingham will begin at once. The building is to be eighteen stories high and is designed exclusively for physicians and surgeons.

(Continued on page 34)



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(Continued from page 516)

ARKANSAS

Dr. Robert P. Harris has been elected Superintendent of the Pulaski County Hospital, Little Rock.

The Lawrence County Medical Society has elected the following officers for this year: Dr. W. W. Hatcher, Imboden, President; Dr. H. R. McCarroll, Walnut Ridge, Vice-President; Dr. J. H. Stidham, Hope, Secretary, and Dr. J. G. Hughes, Hoxie, Delegate.

The Crawford County Medical Society elected the following officers for 1929: Dr. J. A. Wigley, Mulberry, President; Dr. M. S. Dibrell, Van Buren, Vice-President; Dr. John M. Stewart, Van Buren, Secretary-Treasurer, and Dr. O. M. Bourland, Van Buren, Delegate.

The Phillips County Medical Society, which is the oldest medical society in the State, having been organized in 1871, recently celebrated its fifty-eighth anniversary. The following officers were elected for this year: Dr. G. W. Eubanks, Wabash, President; Dr. George R. Storm, West Helena, Vice-President; Dr. M. Fink, Helena, Secretary-Treasurer; Dr. W. C. Russwurm, Helena, Censor: Dr. H. H. Rightor, Helena, Delegate, and Dr. A. E. Cox, Helena, Alternate Delegate.

Deaths

Dr. Jerome E. Wright, Russellville, aged 45, died March 5, after a long illness.

Dr. John T. Fleming, Perryville, aged 63, died February 27, of pneumonia.

DISTRICT OF COLUMBIA

Dr. William Allen White, Superintendent of St. Elizabeth's Hospital, Washington, was chosen by the Medical Society of the District of Columbia to deliver the annual Kober lecture at Georgetown University, on March 25.

Dr. Ales Hrdlicka, Washington, has been elected President of the Washington Academy of Sciences.

Dr. George W. Calver, Lieutenant Commander, Navy Medical Corps, has been appointed official physician to the House of Representatives.

The Eastern Dispensary and Casualty Hospital, Washington, will erect a four-story building costing $200,000 and containing 100 rooms.

Georgetown University Hospital has opened a maternity department of about seventy-five beds. This department will occupy three of the five floors of the wing which was erected a year ago and will bear the names of the late E. Francis Riggs and Dr. George M. Kober.

Deaths

Dr. William R. Goodman, Washington, aged 85, died February 20 of cerebral hemorrhage.

Dr. Mayme Marshall Pile, Washington, aged 80, died February 8 of heart disease.

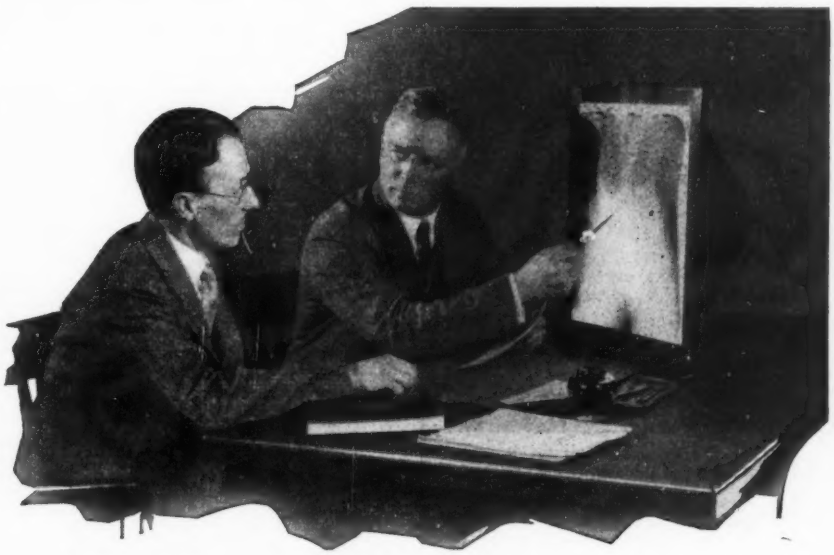
Dr. John Alphonso O'Donoghue, Washington, aged 54, died February 13 of cerebral hemorrhage.

Dr. Thomas Dyer Mudd, Washington, aged 66, died February 11 of arteriosclerosis.

FLORIDA

The Central Florida Medical Society, at their regular semi-annual meeting on February 14, elected the following officers: Dr. S. C. Wood, Leesburg, President; Dr. W. C. Thomas, Gainesville, Dr. H. C. Dozier, Ocala, Dr. J. M. Willis, Williston, Dr. William J. Calvin, Eustis, and Dr. H. S. Cherry, Center Hill, Vice-Presidents; and Dr. J. L. Chalker, Ocala, Secretary-Treasurer.

(Continued on page 36)



The X-ray and the History Check Point for Point

THE term "obscure ailment" is not being heard as often as it once was. With modern diagnostic aids such as the x-ray available there is less cause for calling anything obscure and certainly there is a growing reticence to thus commit oneself.

Strictly speaking, the physician who is competent in the application of modern diagnostic aids need confess to "obscure ailments" very infrequently. Carefully taken histories and scientifically obtained clinical symptoms in the majority of cases check point for point. Surgical findings prove this.

As one of the most generally useful of all scientific diagnostic aids, the x-ray has gained universal medical recognition. It has reached its second stage of development —refinement.

One aspect of this stage is the realization that the best interpretation of x-rays comes through checking with the case history—point for point.

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(Continued from page 34)

The Sarasota County Medical Society has elected the following officers to serve for 1929: Dr. Joseph Halton, Sarasota, President; Dr. J. C. Patterson, Sarasota, Vice-President, and Dr. Frank C. Metzger, Sarasota, Secretary-Treasurer.

Mound Park Hospital Staff, St. Petersburg, has elected Dr. O. O. Feaster, St. Petersburg, as Chief-of-Staff; Dr. R. H. Knowlton, St. Petersburg, Vice-Chief-of-Staff, and Dr. N. W. Gable, St. Petersburg, Secretary.

Dr. Archie McCallister, Tampa, has been appointed Medical Examiner for the United States Veterans' Bureau, Tarpon Springs District.

Dr. Benjamin F. Eckman, Homestead, and Mrs. Irene H. Bril, Covington, Ky., were recently married.

Deaths

Dr. Pierce Butler Wilson, Jr., Hollandale, aged 58, died February 2.

Dr. William G. Mitchell, DeFuniak Springs, aged 84, died January 19, of senility.

GEORGIA

The Altamaha Medical Society was recently reorganized with the following officers elected: Dr. Horace C. McCrackin, Baxley, President; Dr. J. T. Holt, Baxley, Vice-President, and Dr. Overstreet, Baxley, Secretary-Treasurer.

Dr. H. P. Harrell, Augusta, has been appointed Physician for the public schools of that City.

Dr. Eugene E. Murphey, Augusta, was recently elected President of the Surgical Association of the Atlanta and West Point Railroad Company.

Dr. W. R. McCoy, formerly of Folkston, has moved to Jesup.

The Georgia Hospital Association was organized in February with the following officers elected: Dr. Joe R. Clemmons, Macon, President; Dr. Carlisle S. Lentz, Augusta, Vice-President, and Mr. J. B. Franklin, Atlanta, Secretary-Treasurer.

Dr. W. N. Adkins, Atlanta, was reelected President of the Children's Aid Society at the annual meeting recently.

The Piedmont Hospital, Atlanta, has elected the following officers for this year: Dr. Hugh R. Wood, President; Dr. W. A. Smith, Vice-President, and Dr. C. B. Upshaw, Secretary.

Dr. George A. Williams, Atlanta, has moved his offices to 1120 Candler Building.

Georgia Health Officers' Association has elected Dr. Gordon T. Crozier, Valdosta, President for the ensuing year, and Dr. Victor H. Bassett, Savannah, reelected Secretary.

Dr. Jarvis G. Dean, Dawson, has been appointed a member of the State Board of Health.

Dr. Charles F. Griffith, Griffin, was recently appointed a member of the State Board of Medical Examiners.

Dr. Harold F. McDuffie, Atlanta, has been elected President of the Atlanta Academy of Ophthalmology and Oto-Laryngology for this year.

Deaths

Dr. James Harvey Jenkins, Thomasville, aged 82, died January 15 of pneumonia.

Dr. James B. Pendergrass, Jefferson, aged 76, died in January of uremia.

Dr. John M. Anderson, Barnesville, died February 20 of pneumonia.

Dr. F. Counsel Herring, Whigham, aged 51, died in February of pernicious anemia.

(Continued on page 38)

50 DELICIOUS WAYS TO USE KNOX SPARKLING GELATINE IN THE DIABETIC DIET

. . . THE RECIPES contained in the booklet, "Diet in the Treatment of Diabetes," make available a delightful variety of food combinations for the diabetic diet. Because of its recognized purity, and the fact that it is unbleached, unflavored, and free from sugar, Knox Sparkling Gelatine will be found especially valuable in bringing variety, palatability and nourishment to the prescribed diet.

The first part of the booklet carries a reprint of an article from *Modern Hospital,* written by Lulu G. Graves, which discusses the new ideas in diabetic diets. As Miss Graves is Honorary President of the American Dietetic Association, and has specialized in diabetic diets, and has collaborated with leading diabetic authorities, she is well equipped to write advisedly on this all-important subject.

Knox Sparkling Gelatine blends perfectly with the foods commonly used in the diabetic diet, and the increased bulk helps satisfy the constant hunger of the diabetic patient. As each ounce of Knox Sparkling Gelatine contains about 120 calories, the doctor can calculate food formulas exactly. Necessary proteins are added to the diet. Indeed, experiments show that when gelatine is given to humans as the sole source of protein, the waste of body proteins often is reduced by as much as 63.7 per cent (Lusk).

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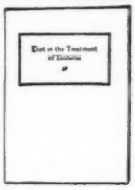
Listed below are other free booklets which are filled with tempting recipes for using Knox Sparkling Gelatine in the liquid and soft diet of invalids and convalescents, as well as the diet for anemia. A further booklet contains a wealth of data on gelatinated milk as used in child feeding. Check those you wish and mail us the coupon.



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(Continued from page 36)

KENTUCKY

Madison County Medical Society has elected the following officers for the year: Dr. R. M. Phelps, Union City, President; Dr. J. A. Mahaffey, Richmond, Vice-President, and Dr. J. G. Bosley, Richmond, Secretary.

Trigg County Medical Society has been reorganized with the following officers elected: Dr. J. R. Boatwright, Linton, President; Dr. J. E. Wall, Golden Pond, Vice-President, and Dr. H. L. Wallace, Golden Pond, Secretary.

Daviess County Medical Society, at their annual meeting, elected the following officers: Dr. W. B. Negley, Owensboro, President; Dr. S. P. Oldham, Owensboro, Vice-President; Dr. S. E. Hainline, Owensboro, Secretary-Treasurer; Dr. P. D. Gillim, Owensboro, Delegate, and Dr. C. M. Rice, Owensboro, Censor.

Dr. J. Ernest Fox has been appointed Superintendent of the Central State Hospital, Lakeland.

The McCracken County Medical Society recently presented Dr. James T. Reddick a traveling bag and fountain pen in appreciation of his seven years' service as Secretary of the Society.

Knox and Whitley Counties have organized a joint Health District and Dr. Martin W. Steels will be in charge, with headquarters at Corbin. There will be three nurses, one each at Corbin, Barbourville and Williamsburg, and a sanitary inspector.

Deaths

Dr. Charles E. Thompson, Covington, aged 70, died January 15 of pneumonia.

(Continued on page 40)

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Second, the Luxor Model Alpine Sun Lamp, the prescription lamp, furnished both to the profession and to patients, but to the latter only on prescription and under the supervision of the attending physician.

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For use at home: Fourth, the Home Model Alpine Sun Lamp, a safe and convenient apparatus, for producing tonic and prophylactic effects with Ultra-Violet Rays. This model is not sufficiently intense for clinical use. This was not brought out to promote the indiscriminate use of Ultra-Violet Rays, but to introduce a modality safe for home treatment, and one with which the physician can combat the use, not only of cheap, fraudulent devices, but also inferior Ultra-Violet Lamps. These, by their ineffectiveness, may easily injure public confidence in the entire science of Light Therapy, and public faith in the physician or surgeon who prescribes it.

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(Continued from page 38)

Dr. Newton J. Rains, Rosine, aged 80, died February 13 of pneumonia.

Dr. Aaron Kern, Louisville, aged 51, died February 9 of heart disease.

Dr. Fleming Mc. Williams, Ashland, aged 59, died suddenly February 13.

Dr. M. Wylie Armstrong, Olive Hill, aged 58, died February 16 of heart disease.

Dr. James A. Bolin, Somerset, aged 57, died February 18 of heart disease.

Dr. Will B. Salin, Glencoe, aged 61, died January 17.

Dr. James Irwin Rathburn, Russell, aged 47, died March 1 of cerebral hemorrhage.

Dr. William L. Underwood, Cropper, aged 79, died January 17 of influenza.

LOUISIANA

St. Mary's Parish Medical Society has elected officers for 1929 as follows: Dr. A. C. Kappel, Franklin, President; Dr. T. H. Gueymard, Morgan City, Secretary-Treasurer; Dr. C. M. Horton, Franklin, Delegate, and Dr. Louis Crawford, Patterson, Alternate.

Caddo Parish Medical Society has elected the following officers for the year: Dr. J. L. Scales, Shreveport, President; Dr. W. S. Harmon, Shreveport, First Vice-President; Dr. D. H. Alverson, Shreveport, Second Vice-President; Dr. J. R. Stamper, Shreveport, Treasurer, and Dr. P. R. Gilmer, Shreveport, Secretary.

Morehouse Parish Medical Society has elected the following as officers for 1929: Dr. S. I. Sims, Bastrop, President; Dr. E. L. Miller, Bonita, Vice-President; Dr. L. E. Larche, Bastrop, Secretary-Treasurer; Dr. W. A. Rodgers, Bastrop, Delegate, and Dr. R. B. Leavell, Bastrop, Alternate.

Iberville Parish Medical Society has elected the following officers for the year: Dr. R. R. Grant, Plaquemine, President; Dr. R. D. Martinez, Plaquemine, Vice-President; Dr. W. E. Barker, Jr., Plaquemine, Secretary-Treasurer; Dr. W. G. Owen, White Castle, Delegate, and Dr. G. A. Darcantel, White Castle, Alternate.

Dr. Ivy D. Boyett, Oxford, Mississippi, has been appointed Health Officer for Iberville Parish.

Dr. Harry H. McClellan, Dayton, Ohio, was recently in Louisiana conferring with the Governor and officers of the State hospitals with a view to establishing a social welfare department to keep in touch with discharged patients, and to acquire more modern equipment for the treatment of mental diseases.

Deaths

Dr. Rene A. Murphy, New Orleans, aged 62, died February 20 of heart disease.

Dr. Walter R. Abney, Lake Arthur, aged 59, died February 8 of paralysis agitans.

MARYLAND

Dr. Harry J. Deuel, Jr., of the Department of Physiology, University of Maryland School of Medicine, has been appointed Professor of Biochemistry in the University of Southern California, Los Angeles, and will leave in June for his new post.

Dr. George R. Minot, Professor of Medicine, Harvard University Medical School, and Director of the Thorndike Memorial Laboratory, gave the second course of the William Sidney Thayer and Susan Read Thayer Lectureship in clinical medicine at Johns Hopkins University School of Medicine, Baltimore, on March 7-8.

(Continued on page 42)

IN THE TREATMENT OF

CYSTITIS and URETHRITIS

OLEO-GOMENOL

has therapeutic properties to an exceptional degree

A most powerful germicide. *An effective deodorant.* *A dependable analgetic.*

Unlike the Eucalyptols it is free of any trace of aldehydes.

For more than twenty-five years Oleo-Gomenol has been continuously and effectively used in the clinics of Europe, and in the offices of several hundred American urological specialists.

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*Neosalvarsan (brand of Neoarsphenamine), made according to the original process of Ehrlich, presents a high degree of antiluetic potency and passes by a wide margin the requirements of the U. S. Public Health Service.

Write for your copy of "Syphilis: Suggestions on Technic and Schedules of Treatment."

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Lubricant Laxative Antacid

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Magnesia-Mineral Oil (25)
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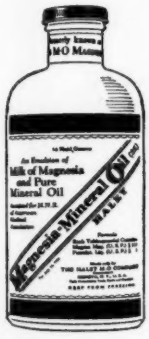

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Generous sample and literature on request

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HALEY M-O COMPANY, Inc.
Geneva, New York

(Continued from page 40)

Dr. Robert W. Hegner, Professor of Protozoology, Johns Hopkins University School of Hygiene and Public Health, Baltimore, has been granted a year's leave of absence to serve as Visiting Professor at the University of the Philippines, Manilla.

Dr. Stewart B. Sniffen, formerly of White Plains, New York, has been appointed Full-Time Psychiatrist to the Clinic of the Mental Hygiene Society of Maryland.

Dr. Thomas O. Otto, Jr., Baltimore, sailed March 20 on a nine months' yachting trip among the islands of the Pacific, accompanying Ex-Governor Pinchot of Pennsylvania.

Deaths

Dr. Robert Tunstall Taylor, Baltimore, aged 62, died suddenly February 21 of heart disease.

Dr. William G. Coppage, Baltimore, aged 55, died February 15.

Dr. Howard Bratton, Elkton, aged 69, died February 26 of pneumonia.

Dr. Alvey J. Smith, Wolfsville, aged 63, died January 12 of acute bronchitis and asthma.

MISSISSIPPI

DeSoto County Medical Society recently elected the following officers for 1929: Dr. J. M. Wright, Hernando, President; Dr. J. A. Rhodes, Horn Lake, Vice-President; Dr. L. L. Minor, Memphis, Secretary-Treasurer and Delegate, and Dr. A. J. Weissinger, Hernando, Alternate Delegate.

(Continued on page 44)

CLASSIFIED ADVERTISEMENTS

LOCATION—Wanted by a physician with twenty years experience in private practice and five in contract practice. Will consider partnership in a paying practice, private or contract. Apply G. P. A., care Southern Medical Journal.

$1000.00 worth of ear, eye, nose and throat instruments for sale. Will sacrifice. Also Sorensen Suction and Pressure Apparatus. One instrument cabinet and a treatment table. Address Mrs. Inez B. Martin, 721 East 41st Street, Savannah, Georgia.

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TO THE MEDICAL PROFESSION: We are filling a long-felt want by conducting a training class teaching blood counts, urinalyses, sputum and feces examination; also basal metabolism readings. We will gladly furnish you with competent office assistants trained in such laboratory procedures as you may require. Our classes are made up of stenographers, bookkeepers, registered nurses and clerks. Send us your office assistant for training. Write or telephone for full information. Dial 3-3598. John V. Mix, Director, Alabama Pathological Laboratory, 1005 Martin Building, Birmingham, Alabama.

LITERARY ASSISTANCE on special medical subjects for busy physicians. We promptly develop any subject of popular or technical interest from the latest authorities, using the unlimited facilities available here. Reasonable rates; correspondence confidential. We also edit, revise and enlarge physicians' manuscripts. Authors' Research Bureau, 500 Fifth Avenue, New York, N. Y.

DRUG AND ALCOHOLIC PATIENTS are humanely and successfully treated in Glenwood Park Sanitarium, Greensboro, N. C.; reprints of articles mailed upon request. Address W. C. Ashworth, M.D., Owner, Greensboro, N. C.

Where there is smoke there must be some fire!

("There can be no great smoke arise, but there must be some fire." Lyly)

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DRYCO

THE DRY MILK COMPANY 15 PARK ROW, NEW YORK

(Continued from page 42)

After seven years' service to the Mississippi State Board of Health, Mr. George Parker has resigned to engage in business.

The annual meeting of the Mississippi State Medical Association will be held at Gulfport May 14-16. Plans are being made for a large attendance and a fine program is being arranged. Headquarters will be the Hotel Markham, Gulfport.

Deaths

Dr. John Sterling Moore, Magnolia, aged 49, died suddenly February 17 of heart disease.

Dr. Eugene Grisson Denson, Meridian, aged 55, died February 20.

MISSOURI

Bell Memorial Hospital, Kansas City, has elected the following staff officers: Dr. Nelse F. Ockerblad, President; Dr. Lawrence P. Engel, Vice-President, and Dr. Earl Padgett, Secretary-Treasurer.

The Missouri-Kansas Neuropsychiatric Society, at its recent meeting in Kansas City, elected the following officers for 1929: Dr. E. T. Gibson, Kansas City, President; Dr. M. L. Perry, Topeka, Vice-President, and Dr. Forrest N. Anderson, Kansas City, Secretary-Treasurer.

At the annual meeting of the Staff of Missouri Methodist Hospital, St. Joseph, officers for 1929 were elected as follows: Dr. H. K. Wallace, President; Dr. C. Greenburg, Vice-President, and Dr. W. T. Stacy, Secretary.

The Midwest Hospital Association held its third annual meeting in Kansas City in February and elected the following officers for 1929: Dr. Fred S. Clinton, Tulsa, Okla., President; Dr. J. C. Bunten, Augusta, Kan., First Vice-President; Dr. Rush E. Castlelaw, Kansas City, Second Vice-President, and Walter J. Grolton, St. Louis, Secretary.

Dr. Jean Yongewaard has been appointed on the staff of the Kansas City General Hospital and will specialize in pediatrics. This is the first time in the Hospital's history that a woman physician has been appointed on the staff.

Dr. Harry Nelson Jennett and Dr. James Harvey Jennett, Kansas City, announce that they are now located in Suite 1125, Rialto Building.

The Johnson County Medical Society met in January and elected the following officers for this year: Dr. S. A. Murray, Holden, President; Dr. W. G. Thompson, Holden, Vice-President; Dr. T. J. Draper, Warrensburg, Secretary, and Dr. W. E. Johnson, Warrensburg, Delegate.

Dr. Glenn R. Northrup, formerly of Crystal City, has moved to St. Louis and is now associated with Dr. Walter E. Hennerich in general practice.

Dr. Logan Clendening, Kansas City, has been nominated Vice-President of the American College of Physicians.

Dr. Robert E. Schwartz, St. Louis, has resigned as Superintendent at Koch Hospital.

The Buchanan County Society voted $75 for the distribution of Hygiea in the public schools.

The St. Louis Medical Society, Washington University School of Medicine and St. Louis University School of Medicine recently held a jubilee, celebrating the fiftieth anniversary of the graduation in medicine of Dr. Joseph Grindon, Professor of Dermatology, St. Louis University Medical School. A plaque of the guest of honor and a leather-bound book containing the name of each guest and contributor were presented to Dr. Grindon. Dr. Grindon is a past president of the St. Louis Medical Society and the St. Louis Dermatological Society,

(Continued on page 46)

At this Season!

Each tablet Calcreose 4 grains contains 2 grains of pure creosote combined with hydrated calcium oxide.

Each fluid ounce Compound Syrup of Calcreose represents Alcohol—24 mins., Chloroform approximately 3 mins., Calcreose Solution 160 mins. (Equivalent to 10 mins. of creosote), Wild Cherry Bark 20 grains, Peppermint, Aromatics and Syrup q. s.

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Two dosage forms of Calcreose are available. Calcreose Tablets, 4 grains, are preferable for the more serious coughs and in bronchitis and tuberculosis.

Compound Syrup of Calcreose will answer your requirements when a pleasant tasting, effective cough syrup is indicated. Liberal samples to physicians. The MALTBIE Chemical Co., Newark, N. J.

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LES ETABLISSEMENTS POULENC FRERES, Paris
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May we again suggest, as in former years, that B. B. CULTURE and B. A. CULTURE are at your service?

We are confident that the results will please you.

B. B. Culture Laboratory, Inc.
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(Continued from page 44)

and is now President of the American Dermatological Association.

Deaths

Dr. James Moores Ball, Jr., St. Louis, aged 66, died March 1 of heart disease.

Dr. Robert L. Hamilton, Richmond, aged 62, died January 24 of carcinoma of the liver.

Dr. Herbert Spencer Maxwell, Hopkins, aged 41, died January 5.

Dr. John P. Sebastian, Caledonia, aged 80, died January 29 of uremia.

Dr. Eugene Bribach, St. Louis, aged 72, died January 26 of diabetes mellitus and cerebral hemorrhage.

Dr. Ervin Wright, Rollo, aged 80, died January 30 following an operation for gallstones.

Dr. James J. Bolton, Williamsburg, aged 98, died January 29.

Dr. Lawrence Thumser, St. Louis, aged 62, died January 26 of pneumonia.

Dr. Charles Henry Lester, Kansas City, aged 71, died February 3 of heart disease.

Dr. John M. Page, Puxico, aged 45, died in February of pneumonia.

Dr. W. A. Robinson, Sturgeon, died February 14.

Dr. B. M. Henry, Alba, aged 59, died suddenly of heart trouble on January 5.

NORTH CAROLINA

A four-story addition to the Charlotte Sanatorium, Charlotte, will be erected soon. The addition will contain 20 rooms and will be for obstetrical cases exclusively.

(Continued on page 48)

Alkali Deficiency

Many diseases are complicated by an "acidosis." An important part in their treatment consists in replacing those elements needed to maintain the alkali reserve.

In clinical practice a rational and agreeable method of alkalinization is afforded in **Kalak Water.**

1 Liter of Kalak Water requires 710 cc. of a standard tenth-normal hydrochloric acid solution for neutralization of the bases present as bicarbonates or carbonates.

Kalak Water is the strongest alkaline water of commerce.

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Has Established

new ideals of Simplicity and Results in feeding infants deprived of breast milk. By going back to fundamentals S. M. A. has literally created new ideals as to simplicity and results. S. M. A. requires no modification or change for full term, normal infants.

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MANHATTAN EYE SALVE COMPANY

Louisville, Kentucky

(Continued from page 46)

Dr. J. E. Dowdy, Winston-Salem, has had to have his right hand amputated because of an infection just above the wrist.

The Durham-Orange Medical Society is planning to erect a marker to the memory of Dr. Edmund Strudwick, famous Hillsboro surgeon of a previous generation. The marker will probably be erected on the new Duke University Campus.

The Tri-State Medical Association held its annual meeting at Greensboro on February 19-21 and elected the following officers: Dr. Cyrus Thompson, Jacksonville, N. C., President; Dr. W. R. Wallace, Chester, S. C., Vice-President; Dr. Julian M. Baker, Tarboro, N. C., Vice-President; Dr. Frank S. Johns, Richmond, Va., Vice-President, and Dr. James M. Northington, Charlotte, N. C., reelected Secretary-Treasurer.

During the meeting of the Tri-State Medical Association in Greensboro a number of the Jefferson Medical College graduates met for an alumni dinner and it was voted and unanimously carried to make this a permanent organization as an auxiliary to the Tri-State Association. Officers for the year were elected as follows: Dr. James K. Hall, Richmond, Va., President; Dr. D. W. Holt, Greensboro, N. C., Secretary-Treasurer; Dr. John N. Neal, Danville, Va.; Dr. Thurman D. Kitchin, Wake Forest, N. C., and Dr. Hugh Black, Spartanburg, S. C., Vice-Presidents.

Craven County Medical Society has elected Dr. Joseph R. Latham, New Bern, President; and Dr. E. L. Bender, New Bern, Secretary, for 1929.

The Tri-County Medical Society has elected the following officers for the ensuing year: Dr. H. T. Menzes, Hickory, President; Dr. J. R. Gamble, Lincolnton, Vice-President, and Dr. J. D. Rudisill, Lenoir, Secretary-Treasurer.

(Continued on page 50)

Laboratories of

Drs. Bunce, Landham and Klugh

ATLANTA, GEORGIA

George F. Klugh, M.D., Director, Laboratory of Clinical Pathology
Jackson W. Landham, M.D., Director, Laboratory of Radiology (X-Ray and Radium)

These laboratories are equipped for making every test of clinical value in the diagnostic study of medical and surgical cases. Only standardized methods and technique are used.

In addition to the diagnostic study of cases there are adequate facilities for the x-ray and radium treatment of conditions in which these forms of treatment are indicated.

Containers for pathological specimens and information in reference to x-ray and radium work furnished upon request.

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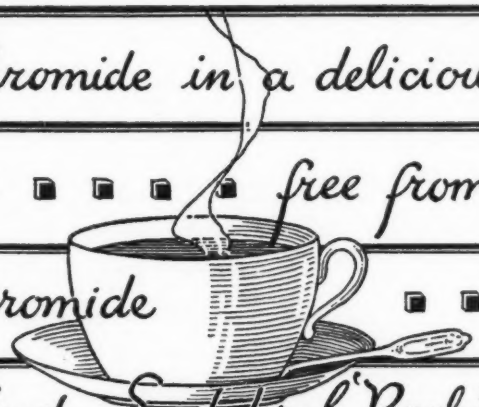

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Each cube contains 17 grains of sodium bromide

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2 cubes in a cupful of very hot water, late in the afternoon or, with crackers, in lieu of the evening meal.

For Nervous Affections:

2 to 4 cubes per day. In nervous indigestion 1 cube may be taken directly with the morning and evening meals, or with every meal, if preferred.

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Ulrich, director of the Swiss Institute for Epileptics at Zurich, uses 3 to 6 cubes per day. Reprints on the use of Sedobrol in epilepsy in this country as well as in Europe will be sent on request.

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NERVOUS INDIGESTION
NERVOUS HEADACHE
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SICKNESS OF PREGNANCY
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NEURASTHENIA
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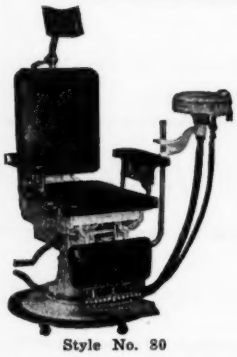

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Complete catalog on request. Sold by reliable dealers everywhere.

(Continued from page 48)

Deaths

Dr. Paul N. Melchor, Fayetteville, aged 62, died recently of paralysis agitans.

Dr. Reuben H. Bryant, Asheville, aged 62, died January 20 of heart disease.

OKLAHOMA

At the recent annual meeting of the St. Johns Hospital Staff, Tulsa, the following officers were elected: Dr. Pierre N. Charbonnet, President; Dr. Wade Sisler, Vice-President, and Dr. C. T. Hendershot, Secretary-Treasurer.

The Fite Clinic, Muskogee, has moved into larger quarters in the Barnes Building, with every modern equipment for a clinic. Physicians composing the clinic are Dr. F. B. Patton, Dr. William Patton, Dr. E. Halsell Fite, Dr. J. L. Blakemore, Dr. F. B. Dorwart, Dr. S. D. Neely, and Dr. C. V. Rice.

Deaths

Dr. James Harvey Cash, Stillwater, aged 67, died February 1 of cerebral hemorrhage.

SOUTH CAROLINA

Oconee County Medical Society recently held its election of officers as follows: Dr. T. G. Hall, Westminster, President; Dr. W. C. Marett, Seneca, Vice-President; Dr. E. A. Hines, Seneca, Secretary-Treasurer, and Dr. J. S. Stribling, Seneca, Delegate.

The Clarendon County Medical Society has elected the following officers for 1929: Dr. Thomas Gunter, Paxville, President; Dr. C. B. Geiger, Manning, Vice-President, and Dr. L. C. Stukes, Summerton, Secretary-Treasurer.

Dr. E. B. Gray, formerly House Surgeon to the

(Continued on page 52)

Burns — Scalds

treated with

Wet Dressings of

Hexylresorcinol Solution S. T. 37

rapidly become

Dry—Clean—Insensitive

Relief of Pain is Immediate

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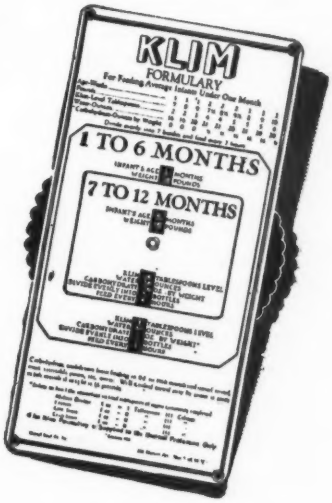

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(Continued from page 50)

Manhattan Eye, Ear and Throat Hospital, New York City, announces the opening of his office at 909-910 Montgomery Building, Spartanburg, for the practice of ophthalmology.

York County Medical Association recently elected Dr. Norma P. Dunning, Resident Physician of Winthrop College, Rock Hill, President; Dr. W. C. Whitesides, York, Vice-President, and Dr. McGill, Hickory Grove, Secretary-Treasurer.

Deaths

Dr. James D. Connor, Smoaks, aged 78, died January 7 of heart disease.

TENNESSEE

Dr. Isaac Barnes, formerly of Pikeville, has been appointed physician of the Tennessee Products Company at Bon Air.

Dr. T. W. Fields has returned to Dresden after residing several years in Kentucky.

Dr. J. I. Huggins, Oak Grove, was seriously injured in an automobile accident early in February.

Memphis is seeking the 1930 Annual Meeting of the American Medical Association.

Humphreys County Medical Society has elected the following officers: Dr. J. T. Cooley, Waverly, President; Dr. John Sugg, McEwen, Vice-President, and Dr. W. W. Slayden, Waverly, Secretary-Treasurer.

Johnson-Sullivan County Medical Society has elected the following officers for 1929: Dr. T. B. Yancy, Kingsport, President; Dr. E. H. Moody, Bluff City, Vice-President, and Dr. H. S. Smythe, Bristol, Secretary-Treasurer.

Coffee County Medical Society has named the following as officers for this year: Dr. R. L. Dossett, Tullahome, President; Dr. C. E. Evans, Tullahome, Vice-President, and Dr. E. P. Vaughan, Manchester, Secretary.

McMinn County Medical Society has elected the following officers for 1929: Dr. James L. Nankivell, Athens, President; Dr. J. S. Basinger, Riceville, Vice-President, and Dr. R. A. Brock, Athens, Secretary-Treasurer.

Campbell County Medical Society has elected the following officers for this year: Dr. J. W. Presley, Pioneer, President; Dr. H. T. Fortner, Jellico, Vice-President, and Dr. F. A. McClintock, Newcomb, Secretary-Treasurer.

Deaths

Dr. Frederick M. Kimsey, Ducktown, aged 58, died February 9, following an operation.

Dr. James Andrew Edwards, Columbia, aged 64, died February 16 of cholelithiasis.

Dr. Isaac J. Brooks, Bearden, aged 71, died February 1 of cerebral hemorrhage.

Dr. Christopher W. Robertson, Somerville, aged 80, died January 20 of arteriosclerosis.

Dr. James A. Anderson, Memphis, aged 66, died January 25 of heart disease.

Dr. John N. Rasar, Elizabethton, aged 53, died March 2 from an auto accident.

TEXAS

Dr. Charles K. Bivings and Dr. James R. Barcus, of Big Springs, announce the opening of the New Bivings and Barcus Hospital.

Dr. George T. Caldwell, formerly Professor of Pathology at Baylor University, Dallas, has been appointed Pathologist and Laboratory Director at the

(Continued on page 54)

ORGANOTHERAPY

can be effective only through the use of dependable endocrine products. The reputation and integrity of the manufacturer is the physician's only guarantee of reliability of those organotherapeutic products for which there is no chemical or biological assay. Every manufacturing process of all our products is supervised by our Analytical and Research Department.

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Insure potency and constancy of action by prescribing the products of

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Manufacturers of Organotherapeutic Products

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Patient Types . . .

The Expectant Mother

DURING the anxious period of pregnancy, you are "the law and the prophets" to the woman. Sympathy and understanding incline you to select a smooth, palatable and comfortable aid to the essential normal peristalsis. What better meets such requirements than Petrolagar?

To avoid bowel complications of pregnancy, Petrolagar is prescribed as a harmless routine.

Petrolagar has many advantages in maintaining bowel function. It is palatable and does not interfere with digestion. It produces normal, soft-formed fecal consistency, providing real comfort to bowel movement.

• Petrolagar is an emulsion of 65% (by volume) mineral oil with the indigestible emulsifying agent, agar-agar.

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Gentlemen:—Send me copy of "HABIT TIME" (of bowel movement) and specimens of Petrolagar.

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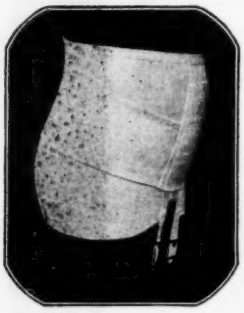

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Hose supporters attached.

Takes Place of Corsets

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NEW ORLEANS, LA.

(Continued from page 52)

Charles T. Miller Hospital, St. Paul, Minnesota. He will also be associated with Dr. E. T. Bell as Instructor in the Department of Pathology at the University of Minnesota.

Dr. Howard S. Aronson, Dallas, has been appointed Superintendent of the Emergency Hospital, succeeding Dr. E. G. Lyon, who has entered public health work.

Dr. Coral R. Armentrout, formerly of Keokuk, Iowa, has moved to Houston and will limit his practice to surgery.

Dr. Edward O. Fitch has moved from San Antonio to Houston, limiting his practice to diseases of children.

Dr. R. F. Bonham, Houston, formerly with the Greenwood Sanitarium, has opened offices in the Medical Arts Building and doing general practice.

Dr. Robert Harvey Bell, Houston, was married to Miss Virginia Kimball of Palestine on January 4.

Ground has been given in Dallas and a group of leading citizens has been organized to establish a Texas Children's Hospital, for which there is a crying need in the Southwest. The hospital is to be non-sectarian, non-profit-seeking, and half of its one hundred beds will be designated for free service. It is to be established for those with mental and physical diseases. J. Edgar Pew, Vice-President of the Sun Oil Company, is head of the Board of Sponsors. Other leading Texas citizens are behind the movement and are working to raise $1,600,000 necessary to build and endow the hospital.

(Continued on page 56)

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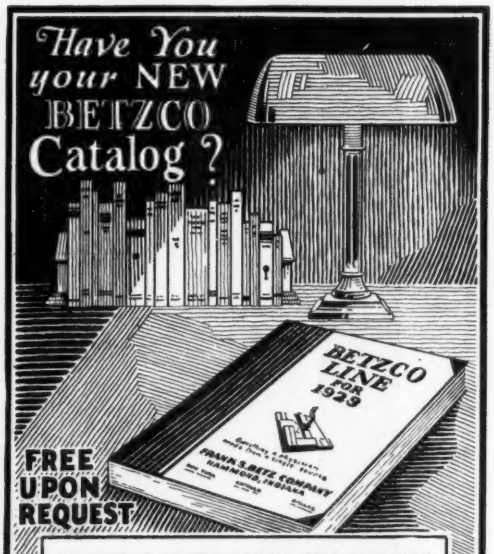

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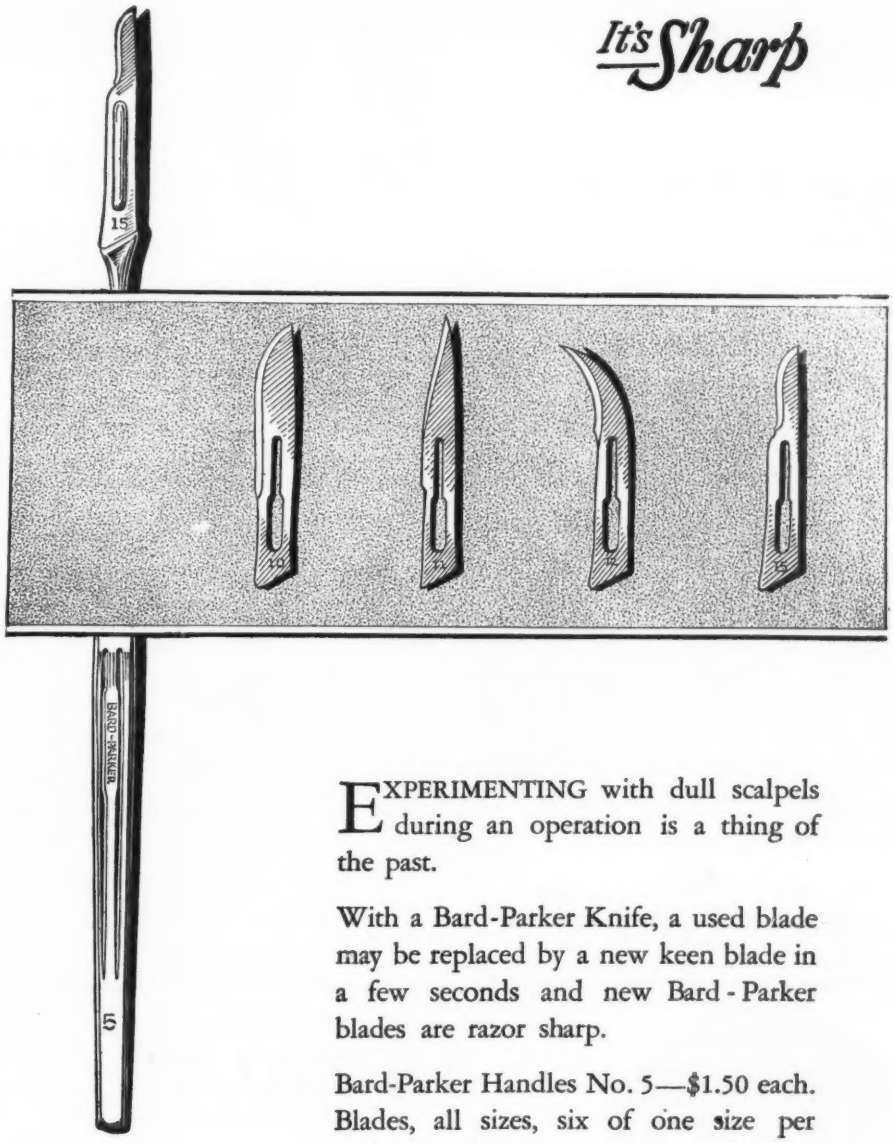

EXPERIMENTING with dull scalpels during an operation is a thing of the past.

With a Bard-Parker Knife, a used blade may be replaced by a new keen blade in a few seconds and new Bard-Parker blades are razor sharp.

Bard-Parker Handles No. 5—$1.50 each. Blades, all sizes, six of one size per package—$1.00 per dozen. Order by number.

BARD-PARKER COMPANY, INC.
369 Lexington Avenue, New York, N.Y.

(Continued from page 54)

Deaths

Dr. Francis Marion Hicks, San Antonio, aged 72, died January 28 of chronic myocarditis.

Dr. William J. Magee, Groveton, aged 53, died February 7.

VIRGINIA

At the annual meeting held in Richmond in February the Virginia Public Health Association elected as its officers for the ensuing year the following: Dr. W. Brownley Foster, Richmond, President; Dr. W. H. Pott, Portsmouth, and Dr. G. F. McGinnes, Richmond, Vice-Presidents, and Dr. F. J. Wampler, Richmond, Secretary-Treasurer. Dr. Mosby G. Perrow, Director Public Welfare, Lynchburg, was elected as representative of the Association to the American Public Health Association.

Dr. Joseph Arthur Gallant, Richmond, was married to Miss Ethel Price, Montreal, Quebec, Canada, February 21.

The Virginia Tuberculosis Association at its annual meeting in February elected the following officers: Dr. Dean B. Cole, Richmond, President; Dr. H. A. Latane, Alexandria, Vice-President, and Dr. Roy K. Flannagan, Richmond, Secretary.

South Boston Hospital, owned and operated by Dr. R. H. Fuller, opened its new edition on March 8, which brought the hospital capacity up to forty beds. Dr. W. R. Counts is Resident Physician.

Dr. Allan M. Kimbrough, formerly of Richmond, has moved to Norfolk, where he will limit his work to orthopedics.

Dr. J. M. Emmett, Clifton Forge, has been named as a member of the Committee in charge of the welfare work of that City for this year.

Dr. Harry Hudnall Ware, Jr., and Miss Mary Warren Williams, both of Richmond, were married February 16.

Dr. Edward W. Rawls, Portsmouth, has been elected a member of the Second District Congressional Committee.

Dr. Andrew F. Giesen, formerly of Brownsburg, has moved to Konawa, Oklahoma, and will be associated with Dr. W. J. Long in general practice.

Dr. Francis W. Upshur, Richmond, has resigned as Executive Surgeon of the Virginia Electric and Power Company after having served for twenty-six years. He is devoting his whole time to private practice.

Dr. F. Thomas Amiss, formerly of St. Charles, has moved to Luray.

Deaths

Dr. Homer Silon Henkel, Staunton, aged 43, died February 12 of heart disease.

Dr. John J. Nelson, Sr., Columbia, died February 15 after an illness of several years.

Dr. William Thomas Williamson, Richmond, aged 64, died February 17 of pneumonia.

Dr. Junius C. Gregory, Tunstall, aged 91, died in February of heart disease.

Dr. Q. William Moone, Richmond, aged 62, died February 6 of cerebral hemorrhage.

Dr. Frederic C. Tice, Roanoke, aged 71, died February 10.

(Continued on page 60)

WHEN ON THE ROAD TO RECOVERY

CONVALESCENCE demands the utmost in recuperative power . . . That is why Horlick's the Original Malted Milk is used with such universally good results when the patient is ON THE ROAD TO RECOVERY.

It supplies nutrients most needed for the rebuilding of health and strength. By the exclusive Horlick process, these food elements are rendered easily and quickly assimilable. For samples, address—

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FULL LITERATURE UPON REQUEST

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A FOOD
With a Medicinal Effect

LACTO DEXTRIN is a carefully prepared combination of the two well known carbohydrates, lactose and dextrin. It is, therefore, not a medicine but a concentrated food.

Experimental and clinical research confirm that this special carbohydrate food provides the right soil for the growth of anti-putrefactive germs in the colon.

Lacto Dextrin is, therefore, an ideal agent for use in cases of intestinal putrefaction and toxemia, because it affords a rational and effective method of restoring the normal intestinal flora.

Sometimes, in obstinate cases with constipation, it may be necessary to combine its use with Psylla (plantago psyllium)—a plant seed which acts by supplying bulk and lubrication.

The story of how to use Lacto Dextrin and Psylla is contained in the interesting presentation "A Practical Method of Changing the Intestinal Flora." We will be glad to send you a copy together with clinical trial packages on request.

Lacto Dextrin and Psylla are available at all good prescription pharmacies

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Send me, without obligation, trial tins of Lacto Dextrin and Psylla, also copy of treatise, "A Practical Method of Changing the Intestinal Flora."

NAME (Write on margin below) ADDRESS

DIETING

for slimness ruinous to health of Hollywood's stars

Doctors and nurses, in warning the public of the dangers of extreme dieting, will find support in the sad experience of motion-picture stars.

A NEW danger to the health of motion picture stars has just been revealed. The motion picture camera, in photographing a star, adds from 5 to 20 pounds to the appearance of her figure, so that many screen celebrities, because of the fad for slimness, have felt called upon to undergo rigorous programs of dieting.

Photoplay Magazine recently announced that many of the stars have suffered collapse because of this dangerous practice. One famous star died of tuberculosis aggravated by weight reduction. Another ruined her career and was made an invalid by starvation. Still another collapsed on a set from trying to lose 10 pounds.

One of the alarming dieting extremes indulged in by the stars, according to *Photoplay*, is eating no food at all for breakfast, and seriously limiting the quantities of nourishing foods for both luncheon and dinner.

Physicians and nurses and teachers, looked to as health authorities, should help bring a speedy end to the dangerous practice of indiscriminate diets to reduce.

The "boyish" figure is a false standard of feminine beauty, and its attainment is likely to be at the price of permanent injury.

Modern health opinion recommends a variety of foods, including vegetables and fruits, both fresh and canned, sweetened for enjoyment. Sweetness is the flavor that encourages the ingestion of nearly all the healthful roughage, vitamin-bearing foods. Breakfast is a meal likely to be slighted by young working girls and many other busy working people. For this meal sugar should be used to develop the delicious flavors of the beneficial foods.

Let people be warned to eat enough. Most foods are more delicious and nourishing with sugar. Good food promotes good health. The Sugar Institute, 129 Front Street, New York, N. Y.

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INTENSIFYING SCREENS—Buck X-Ograph or Patterson Screens for fast exposures, alone, or mounted in cassettes. Liberal discounts. All-metal cassettes, several makes.

If you have a machine have us put your name on our mailing list.

GEO. W. BRADY & CO.
780 So. Western Ave.
CHICAGO

(Continued from page 56)

WEST VIRGINIA

The Grant-Hardy-Hampshire-Mineral County Medical Society has named the following as officers for this year: Dr. R. W. Love, Moorefield, President; Dr. J. B. Groves, Petersburg, First Vice-President; Dr. Paul R. Wilson, Piedmont, Second Vice-President; Dr. E. B. Martin, Romney, Third Vice-President; Dr. O. V. Brooks, Moorefield, Fourth Vice-President, and Dr. T. C. Giffin, Keyser, reelected Secretary-Treasurer.

Summers County Medical Society held its meeting at Hinton on March 20, with Dr. G. L. Pense, Hinton, President, and Dr. A. P. Hudgkins, Hinton, Secretary.

Dr. E. Bennette Henson, Charleston, formerly doing general surgery, is now limiting his practice to injury and disease of bones and joints.

Dr. Joseph F. Maxwell, formerly of Monmouth, Illinois, assumed his duties as Health Officer of Raleigh County on March 15.

The West Virginia Tuberculosis and Health Association will conduct a campaign for the Early Diagnosis of Tuberculosis during the entire month of April. Twenty-eight county agencies have already ordered literature and posters, and additional supplies have been ordered by the Association to take care of the needs of other agencies.

The Montgomery Clinic, Montgomery, recently held a series of three weekly Cardiac Conferences under the direction of Dr. Milton C. Borman. The Conferences were well attended by physicians from various parts of the County.

The West Virginia State Medical Association will hold its annual meeting at Martinsburg May 21-23, with headquarters at the Shenandoah Hotel.

Deaths

Dr. D. E. Musgrave, Barboursville, aged 60, died March 16.

THE STANDARD

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THE greater known assimilation limits of Mead's Dextri-Maltose make this form of carbohydrate most acceptable to replace the deficiency found in all cow's milk and water formulae. This is true of any system of infant feeding.

For many years physicians have used it with good results in fresh cow's milk and water modifications. Yet within recent years the milk itself has undergone various modifications or alterations for the sake of preservation. In many cases these alterations have given definite advantages over fresh milk for different conditions in infant feeding.

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Powdered Lactic Acid Milk
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The advantages following the use of Mead's Dextri-Maltose in fresh cow's milk and water mixtures will be present when this carbohydrate is used in any of the above milk mixtures.

Use it in these formulae as you do in the feedings prepared from fresh cow's milk and water. Its addition to the infant diet in any of these milks will meet with good clinical results in the majority of cases. Its known assimilation limits assure its absorption with a minimum tax upon the digestive tract of the infant. Freedom from nutritional disturbances has always been noticeable whenever it is used.

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Infant Diet Materials Exclusively

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Neo-Silvol Contains 20% Silver Iodide in Colloidal Form

Note these facts: Neo-Silvol is fatal to the gonococcus, streptococci, staphylococci, pneumococci, and Micrococcus catarrhalis. Against streptococci and staphylococci it is as actively germicidal as *pure phenol*—and applicable in much more concentrated solution. Against the gonococcus it is *20 times as active as pure phenol.* Yet Neo-Silvol does not precipitate tissue chlorides, nor does it coagulate cellular albumin; weak acids or alkalis or dilute alcohol do not precipitate it.

Neo-Silvol should be at hand for use in treating infectious inflammation of *any mucous membrane*—in eye, ear, nose, throat, urethra, or bladder.

HOW SUPPLIED

In 1-oz. and 4-oz. bottles of the granules—In 6-grain capsules, bottles of 50, convenient for making solutions—As a 5% ointment in 1-drachm tubes—In the form of Vaginal Suppositories, 5%, boxes of 12

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